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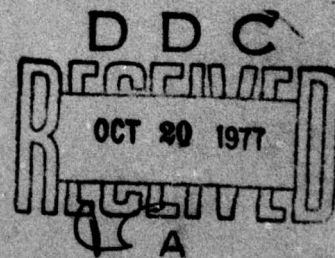


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② **STAFF STUDY REPORT.** ①

**TECHNICAL DOCUMENTATION.**

**TEC - DOC**



✓ **DEFENSE LOGISTICS AGENCY**  
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The purpose of this study was to

## PROBLEM

To examine the various <sup>(maintenance)</sup> technical manual (TM) systems for producing, distributing, maintaining and using ~~technical manuals~~ <sup>TM's</sup> within the Department of Defense, (DoD), and to evaluate these processes in order to develop improved user-oriented TMs through identification of the best method(s) for producing, distributing, maintaining and using such publications.

## BACKGROUND

### 1. AUTHORITY

The Assistant Secretary of Defense, Installations and Logistics, ASD(I&L), by memorandum of 10 September 1976, requested the Defense Logistics Analysis Office (DLAO) to perform a definitive review and analysis of the methods and equipments for the production, update, distribution and use of technical manuals. This assignment required the identification and assessment of the Services' current practices and future plans regarding TM production, distribution and use, and the recommendation of alternative methods and systems having the most promise from an overall Department of Defense viewpoint.

The genesis of the Study was the observation of the diversity and complexity in current TM systems by the Office of the Assistant Secretary of Defense (OASD) during field visits. There are currently several known attempts to automate the production of TMs. Automation includes the digitization or inputting into computerized records of either textual or graphic information, or both. Depending upon the degree of automation present, an interactive terminal may be attached to correct or modify either textual or graphic both in an on-line mode. These systems can be very complex and may be very expensive.

In addition, numerous and varied types of technical manuals have been observed in use at the depot, intermediate and organizational levels of maintenance, both inter- and intraservice, posing problems of interchangeability and effectiveness.

A copy of the assignment memorandum with a study plan is enclosed at Appendix A to this report.

## 2. OBJECTIVE

The objective of the TEC-DOC Study is to determine, develop, and propose a cost/effective DoD TM System, considering the basic components in the TM System: production, distribution, maintenance and use. Critical to this consideration is the attention to the maintenance environment at the depot, intermediate and organizational levels of maintenance. A corollary consideration is the types of maintenance publications and their respective purposes.

## 3. SCOPE

The scope of the assigned study plan includes a definition of the types of technical manuals to be considered and the TM functions or processes to be surveyed. These are referred to as "horizontal" and "vertical" scope.

### a. HORIZONTAL SCOPE

The range of coverage is included in horizontal scope. This refers to the types of publications that were included in the analysis of technical manual systems. TMs in this context were limited to maintenance technical manual types, i.e., manuals required for the actual performance of maintenance or operation of equipment.

### b. VERTICAL SCOPE

The depth of coverage of TM systems is referred to as vertical scope. Included is the processing of the source data to produce the various output media (TMs), and distribution of these media to the ultimate users, the operator and maintainer of equipment. At the user level, the TEC-DOC scope includes a review of use at the depot, intermediate, and organizational levels of maintenance, and the types of environment that obtain at these particular levels of maintenance.

### c. EXCLUSIONS

The primary sponsor for the study was the Assistant Secretary of Defense (Installations and Logistics) (Maintenance Policy) (ASD(I&L)MD); therefore, the study was



essentially restricted in accordance with the mission of the Maintenance Directorate. The boundaries of the study effort were drawn to include the types of TM publications and TM system processes within the purview of maintenance. The areas listed below were excluded to delimit the problem to manageable proportions and to permit completion of the Study within available resources.

#### (1) TECHNICAL DATA DEVELOPMENT

Technical data acquired and developed in conjunction with the acquisition of end items of equipment is under the cognizance of the Assistant Secretary of Defense (Installations and Logistics) (Materiel Acquisition) (ASD(I&L)DW) and is, therefore, excluded.

A thorough review and analysis of TM content and format is beyond the reach of this Study, and would require a separate study in itself, requiring on-site evaluation of the cost and effectiveness of each. Such an evaluation would necessitate consideration of job performance and human engineering factors. Exclusion of this area by the TEC-DOC Study in no way reflects upon its importance to the effectiveness or usability of technical manuals.

#### (2) TECHNICAL MANUAL CONTENT

The content and presentation format of technical manuals are determined at the time of acquisition of the technical data base. At that time, the types of publications and the information presentation method is determined based upon the maintenance program and level of user involved. Technical manuals are acquired at the time of equipment acquisition, and content and format are governed by the applicable specification referenced in the contract. Specifications for TMs are managed by the Assistant Secretary of Defense (Installations and Logistics) (Standardization and Support Directorate) (ASD(I&L)WS) and the Defense Materiel Specifications and Standards Office (DMSSO), which reports to ASD(I&L)WS.

#### (3) TRAINING

Training comes under the purview of the Assistant Secretary of Defense (Manpower and Reserve Affairs) (ASD(M&RA)). Generally, in the current environment, training manuals are developed from TMs; however,



the OSD and the Services are exploring methods to determine requirements for both maintenance and training at the time of acquisition of technical data.

#### **(4) ADMINISTRATIVE MANUALS**

Because of the definition of technical manuals contained in DoD Directives, some of the Services have classified purely administrative instructions as technical manuals. These types of manuals were excluded since there was no direct relationship to the basic objective of developing a cost/effective Maintenance Technical Manual (MTM) system.

A separate effort has been chartered by ASD(I&L) letter of 4 November 1976, for the review of technical data base acquisition, operating and support cost reduction and maintenance improvement. This review is primarily technical data base and technical data content oriented with a view for having a common data base to be used for maintenance as well as training. The action office for this effort is the Assistant Secretary of Defense (Installations and Logistics) (Acquisition and Support Planning) (ASD(I&L)WR). The TEC-DOC Study Team has exchanged information and coordinated its efforts with the ASD(I&L)WR action office to ensure compatibility and to preclude overlap of efforts between the two groups.

#### **4. APPROACH**

The study approach listed in the TEC-DOC Study Plan had four phases.

- a. PHASE I - PLANNING AND INDOCTRINATION**
- b. PHASE II - RESEARCH**
- c. PHASE III - ANALYSIS AND REPORT PREPARATION**
- d. PHASE IV - BRIEFINGS**

The first phase included background research and problem identification. During this phase the study group obtained and reviewed DoD and Service directives, studies and other pertinent literature. DoD Component headquarters

level briefings were conducted to obtain an orientation of current and proposed TM Systems. Because of the nature of this Study, data obtained during Phase I included information related to technical data production, distribution and use at organizational levels below headquarters and, therefore, extended into Phase II. This research was used to further identify and define the problem, and to develop the detailed methodology for the future conduct of the Study in order to develop alternative solutions to the problem.

The first phase has been completed. After completion of this phase, it was determined that there was a principal, viable, alternative to the completion of the Study. The remainder of this report is devoted to describing the results of the research leading up to the development and recommendation of an optimum alternative for the development of a cost/effective TM system.

## 5. METHODOLOGY

### a. CONCEPT

The detailed approach or methodology was to view the technical manual program as a system. Figure 1 depicts a classical system with the five major subsystems or functional components. Each of these components or subsystems has a bearing on the achievement of the ultimate objective of cost/effective maintenance. It was the intent of the study group to review and analyze each of these components to the extent included within the scope of the Study.

### b. TASKS

In order to accomplish the Study objectives in accordance with the Study concept the following tasks were established:

- (1) Problem Definition,
- (2) Current and Proposed Systems Analysis,
- (3) Alternatives Determination,
- (4) Cost/Effectiveness Analysis and
- (5) Proposed System Delineation.



# TM SYSTEM

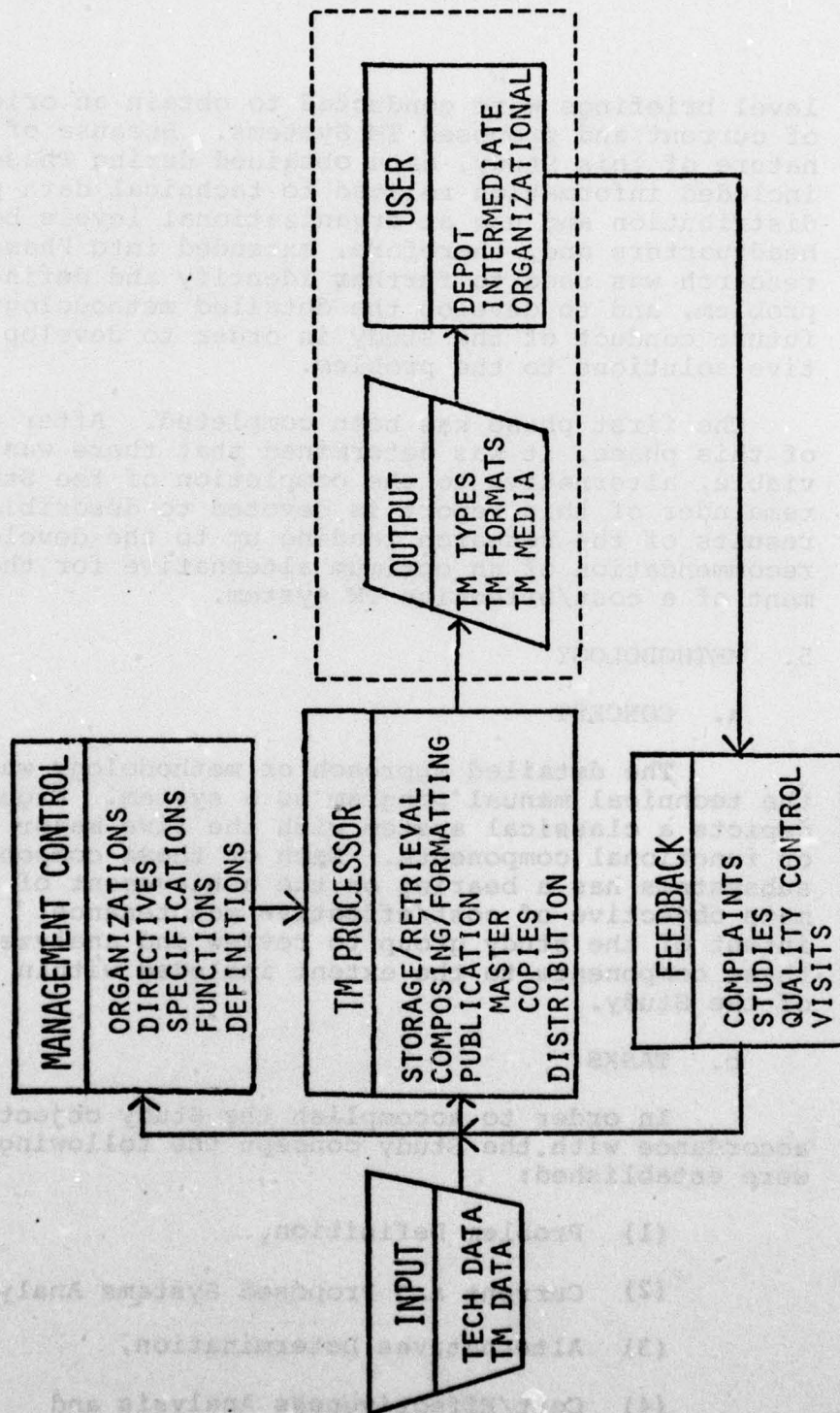


Figure 1



Tasks 1-3 above were accomplished based upon completion of Phase I (Planning and Indoctrination) and partial completion of Phase II (Research). The results of this research are depicted in the following Section. This Staff Study Report is based solely upon research conducted during Phase I and part of Phase II.

## DISCUSSION

The discussion in this section of the report is based upon completion of background research and a preliminary analysis of current and planned Service TM Systems. Technical Manuals are viewed as a system (see Figure 1) considering the required inputs or data base and the processing of these inputs to the user output--Technical Manuals. A listing of definitions relative to technical manuals and TM processes is contained in Appendix B.

### 1. INPUT/OUTPUT

#### a. INPUT

The inputs into the production cycle for new and/or revised TMs are the technical data bases or TM data content that is developed and procured with the equipment. Consideration of input was limited to the physical processes related to the storage and retrieval of data. The acquisition and content of the technical data base was excluded in the study assignment. The physical processes of data storage and retrieval are discussed under current and planned systems below.

#### b. OUTPUT

Technical manuals are the outputs from the processing of technical data. There are many forms of TMs in terms of type, content/format or information presentation style and method, and media as illustrated below.

#### (1) TM TYPES

There are several types of publications currently identified as technical manuals, in the general sense of the word, by the Services. The TEC-DOC Study

was chartered to review only those TMs associated with the maintenance or operation of equipment; however, the Services/Agencies do include many other types of documents as shown in Appendix C. Part of this problem is attributable to current definitions of technical manuals used by DoD and DoD Components. Definitions of technical manuals are further discussed under TM Management, paragraph 2 b below, since this is considered a management problem. The five basic generic types of TMs are shown below.

- (a) Maintenance
- (b) Operator
- (c) Training
- (d) Administrative
- (e) Supply

## (2) CONTENT/FORMAT

The content of TMs was excluded by the study charter, however, content is determined at the time of acquisition of associated equipment and is governed by the applicable technical manual specification in the contract. Specifications are considered a function of TM management and will be further discussed in that section of the report. There are a number of different information presentation styles and methods for maintenance technical manuals. Examples of the generic classifications are shown below.

- (a) Traditional Manual Format
- (b) Work Packages
- (c) Trouble Shooting Aids
- (d) Flow Charts
- (e) Function Oriented
- (f) Task Oriented
- (g) Comic Book



Coverage under current and planned systems below will indicate that this area is already being addressed by several study efforts.

### (3) MEDIA

Output media for technical manuals is quite diversified and reflects various degrees of sophistication. Types of media currently in use or being planned for TMs are shown below.

- (a) Hard Copy
- (b) Microfilm
- (c) Microfiche
- (d) Audio/Video Disc
- (e) Audio/Video Cassette
- (f) Plasticized Card

There is a large variance in the types, content and media of technical manual outputs. This variance is attributable to the different approaches taken by the various organizational components among and within the Services. Technical manual specifications/standards control and determine the end product to be provided to the user. These specifications are, in turn, controlled by the organizations responsible for technical management described below.

## 2. MANAGEMENT

The review of technical manual management or control revealed the same aspect of diversity associated with TM outputs. This was expected since the TM management structure is responsible for the types of TMs produced. Technical manual management or control is accomplished by the various organizational levels involved with TMs through the directives, specifications and definitions promulgated by these organizations to exercise the responsibilities, functions and authorities of the different levels of management.



## a. ORGANIZATIONS

### (1) LEVELS

There are a number of organizations involved with TM management both within the OSD itself as well as within the Services. Although this section of the report primarily treats organizations at the OSD level, indications of fragmentation and/or overlap of responsibilities, functions and authorities within the Services is shown throughout the report during discussions of the diversity, overlap and redundancy in such areas as TM specifications, funding, media, systems processes and studies. Figure 2 provides an organizational chart depicting those organizational elements within the OSD that are in some way associated with TM management. The primary organizational elements are ASD(I&L), the Director of Defense Research and Engineering (DDR&E) and the Comptroller (ASD(C)). This chart was developed using the charters for the Assistant Secretary level, organizational/functional charts and DoD Directives. Explanation of the relative type and degree of involvement is provided below.

### (2) RESPONSIBILITIES/FUNCTIONS/AUTHORITIES

The primary organizational elements in the TM management system and their exercise of management control through their applicable functions are outlined in Table 1. Responsibility for the funding function will be addressed separately under another section related to funding.

TABLE 1

#### MANAGEMENT CONTROL

| TM FUNCTIONS         | I&L |    |    | DDR&E | MR&A | COMP | JCP |
|----------------------|-----|----|----|-------|------|------|-----|
|                      | WR  | MD | WS |       |      |      |     |
| RDT&E                | X   |    | X  | X     |      |      |     |
| DATA BASE            | X   | X  | X  | X     | X    | X    |     |
| PRODUCTION-INITIAL   | X   |    | X  |       |      | X    |     |
| PRODUCTION-FOLLOW ON | X   | X  | X  |       |      | X    | X   |
| DISTRIBUTION         |     |    |    |       |      | X    |     |
| USE                  |     | X  | X  |       | X    | X    |     |

# OSD TM MANAGEMENT STRUCTURE

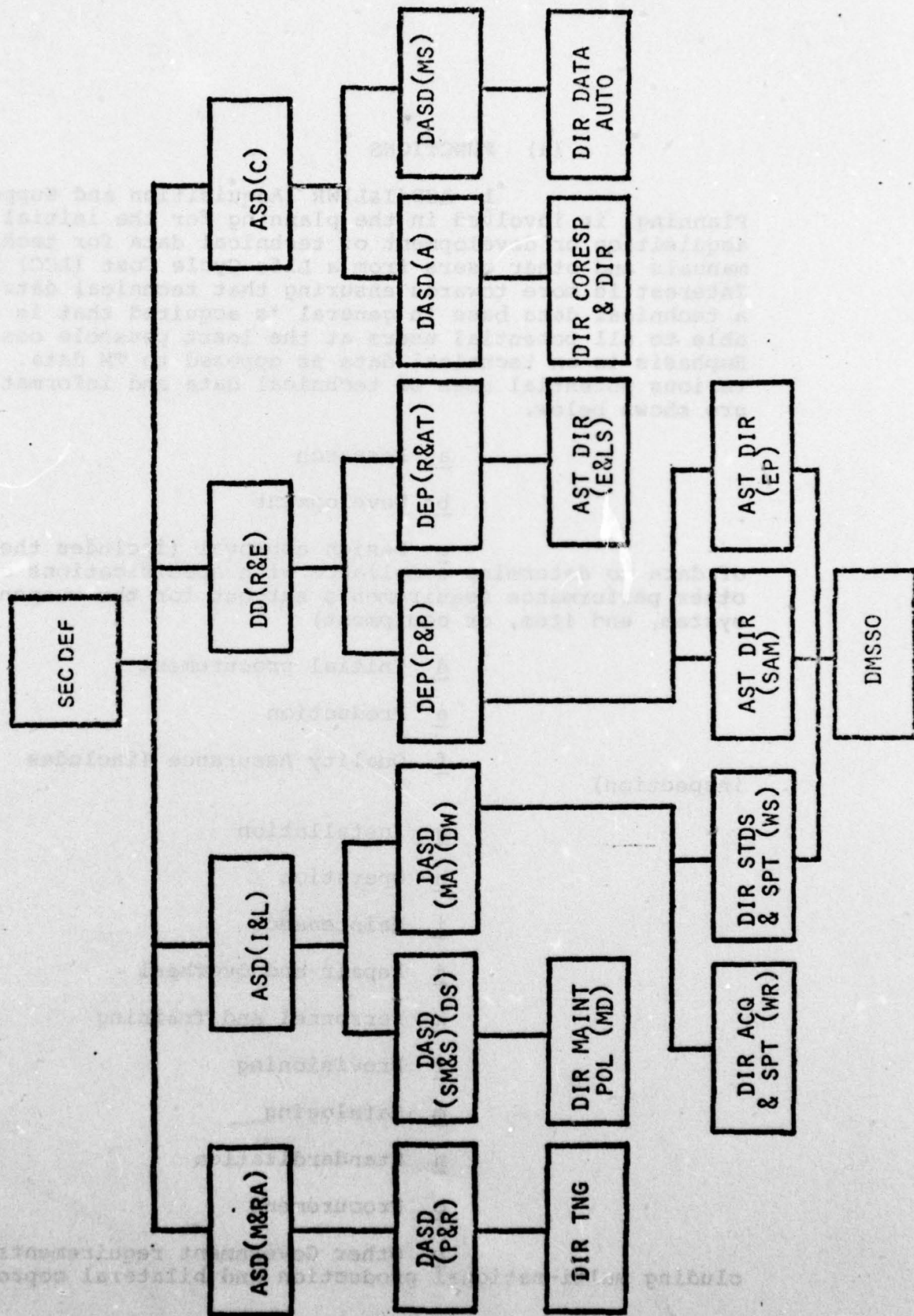


Figure 2



(a) FUNCTIONS

1 ASD(I&L)WR (Acquisition and Support Planning) is involved in the planning for the initial acquisition or development of technical data for technical manuals and other users from a Life Cycle Cost (LCC) basis. Interest is more towards ensuring that technical data or a technical data base in general is acquired that is suitable to all potential users at the least possible cost. Emphasis is on technical data as opposed to TM data. The various potential uses of technical data and information are shown below.

- a Research
- b Development
- c Design approval (includes the use of data to determine compliance with specifications or other performance requirements set out for the weapons system, end item, or equipment)
- d Initial procurement
- e Production
- f Quality Assurance (includes inspection)
- g Installation
- h Operation
- i Maintenance
- j Repair and Overhaul
- k Personnel and Training
- l Provisioning
- m Cataloging
- n Standardization
- o Procurement
- p Other Government requirements including multi-national production and bilateral coproduction

2 ASD(I&L)MD (Maintenance Policy) is primarily interested in maintenance technical data and technical manuals as an end product (output) in consonance with its program responsibility for equipment operations, maintenance, and support. From a user standpoint, maintenance technical data is required for technical manuals for performance of the maintenance function. This Directorate is also responsible for the maintenance (update) of technical manuals and resultant changes to TMs.

3 ASD(I&L)WS participates in the total TM management functions from design and development to use under its responsibilities for management of technical data, technical information and technical manuals. This is performed under the auspices of the DoD standardization program and functional assignment for specifications for technical data, technical manuals and output media and output media retrieval equipment, including microform media and microform viewer/printers.

4 Director Defense Research and Engineering has the responsibility for Research, Development, Test and Engineering (RDT&E) as relates to any or all of the TM functions; however, this organization also has joint responsibility with ASD(I&L) for the acquisition and development of technical data, technical information and corresponding technical data bases.

5 Manpower and Reserve Affairs is interested in technical data and technical manuals for training at the user level.

6 Comptroller interest applies to the extent that utilization of automated data processing, microform or printing equipments or systems are applicable.

7 Joint Committee on Printing (JCP) has cognizance over all Government printing, binding and distribution including both media and equipment associated with these processes.

#### (b) RESPONSIBILITIES/AUTHORITIES

Although the charters for the Assistant Secretaries specify the broad responsibilities, functions and authorities, the primary authority emanates from the



authority to issue directives, to carry out and implement DoD objectives and policies. The primary directives pertaining to the development and use of technical manuals are shown in Table 2 associated with the applicable responsible OASD Directorate and associated responsibility.

TABLE 2  
DIRECTIVES/INSTRUCTIONS

| ORGANIZATIONS |             | AUTHORITY    | SUBJECT INDICATING RESPONSIBILITY                                |
|---------------|-------------|--------------|--|
| OASD          | DIRECTORATE |              |  |
| DDR&E & I&L   | R&AT        | DoDD 5100.36 | DoD Technical Information  |
| I&L & DDR&E   | WS          | DoDI 5010.12 | Management of Technical Data                                     |
| I&L           | WS          | DoDD 4120.3  | Defense Standardization Program                                  |
|               | WS          | DoDI 4151.9  | Technical Manual Management                                      |
|               | MD          | DoDD 4151.16 | DoD Equipment Maintenance Program                                |
| COMPTROLLER   | A           | DoDI (Draft) | Microform Policy   |
|               | A           | Adm Ins 85   | Microform Policy   |
|               | A           | DoDD 4105.55 | Selection and Acquisition of Automatic Data Processing Resources |
|               | A           | DoDI 7041.3  | Economic Analysis and Program Evaluation for Resource Management |

The basis or foundation for technical manual policy is derived from two "umbrella" regulations from which other regulations addressing technical manuals derive their authority. These are DoDD 5100.36 and DoDI 5010.12 which are under the joint responsibility of ASD(I&L) and DDR&E.

1 DoDD 5100.36 establishes the basic policy and concept for the handling of technical information within the DoD. This directive provides for the coordination and management of the DoD Scientific and Technical Information Program under the responsibility of DDR&E and the DoD Production Engineering and Logistics Information Program under the responsibility of ASD(I&L).

2 DoDI 5010.12 implements DoDD 5100.36 by establishing the DoD Technical Data Management Program covering the life cycle of technical data from requirements determination, generation, acquisition, use, handling, storage, retrieval, maintenance, distribution and disposal.

3 DoDD 4120.3 establishes the Defense Standardization Program pertaining to the development and promulgation of specifications, standards, handbooks and engineering drawings for materiel, manufacturing processes and engineering practices that describe the items and services employed in the design, test and evaluation, procurement, production, maintenance, supply and disposal of materiel acquired by the DoD Components. This directive provides the vehicle for operational management of the technical data/information program.

4 DoDI 4151.9, under the authority of the technical data/information program established policies and procedures for the management of technical manuals used in the operation and maintenance of defense materiel. Policy coverage includes the entire life cycle for technical manuals from requirement, generation, acquisition, distribution, update, data content, format, media, storage and retrieval, and budgeting/funding procedures. The Defense Materiel Specifications and Standards Office under the joint management direction of DDR&E and ASD(I&L) administers the Technical Manual Management Program under this directive as well as the Defense Technical Data and Defense Standardization programs.

5 DoDD 4151.16 under the sponsorship of the ASD(I&L)MD sets forth objectives and policies for the conduct of equipment maintenance management and engineering programs within DoD. Part of this policy covers the qualitative and quantitative requirements for the preparation and procurement of maintenance technical data and publications for improved utilization by operating and maintenance personnel from a user standpoint; however, this directive references the Technical Manual Management Instruction (DoDI 4151.9) for detailed policy guidance in this regard.

6 The Comptroller has issued several directives that govern the use of microform media and equipment, and data processing equipment in the production and



use of technical manuals; however, the specifications for microform media and viewer/printers comes under the cognizance of DMSSO. The microform regulations recognize the role of and reference the microform standards promulgated by DMSSO.

b. DEFINITIONS

There are a number of definitions for technical manuals. Appendix B contains a listing of pertinent definitions. It should be noted that in practice the terms technical data, technical information and technical manuals are frequently interchanged. The definition of technical data uses the term "information" to define data and the term "data" is used in the definition of technical information.

The current DoD Regulation on Technical Manual Management defines technical manuals as follows:

*Publications and other forms of documentation containing a description of defense materiel with instructions for effective use. They will normally include operational instructions; maintenance instructions; parts lists or parts breakdown; and related technical information or procedures exclusive of administrative procedures. Other categories of technical publications may be classified as TMs upon determination by using DoD Components.*

The Defense Logistics Agency (DLA) and the Marine Corps published directives containing definitions identical to the DoD definition; however, other Components publish their own versions.

Although the DoD definition excludes administrative procedures, the catchall phrase, *Other categories of technical publications may be classified as TMs upon determination by using DoD Components*, permits DoD Components to classify practically any and/or all categories of publications as technical manuals at will. Appendix C provides a vivid illustration of the application of the various Service versions of definitions of technical manuals to include various categories of publications.

The current DoD definition with its catchall phrase and the interpretative definitions published by various organizations within and among the Services contributes to the divergent application of the categorization of publications as TMs by the DoD Components and resultant problems in TM management.

### c. SPECIFICATIONS/STANDARDS

The policy level of management is exercised by the organizational strata, discussed above, through the issuance of directives and definitions. The exercise of the technical level and functional/operational levels of management are accomplished through implementing directives and the development and use of specifications that determine the content, format and media of technical manuals.

The responsibility for standardization of specifications and standards for technical manuals rests with DMSSO; however, in the Services, the study group found that the determination of what technical manuals are or will be is left to the discretion of the individual organizational elements responsible for the determination of equipment requirements and the acquisition of equipment technical manuals that respond to user requirements. In practice this means that the program/project manager in the acquisition command such as the Commodity Commands in the Army, Hardware Systems Commands in the Navy and the Systems Program Offices (SPOs) in the Air Force determine the requirements or specifications controlling the content, format and media for technical manuals.

Appendix D represents the results of a preliminary survey by TEC-DOC of technical manual specifications related to acquiring technical manuals. This listing includes both general and special purpose type specifications. An example of a general purpose specification for technical manuals in general and an example of special purpose specification is the one for the manuscript requirements for maintenance of aircraft engines.

There are hundreds of types of general and special purpose technical manual specification documents currently in effect governing the content, format and media for technical manuals. Project managers may select from these specifications to specify technical manual requirements,



modify these specifications to fit particular circumstances or prepare entirely new specifications to cover what the project manager considers to be special purpose requirements. In addition, commercial technical manuals may be procured using commercial technical manual specifications.

d. FUNDING

(1) FINANCIAL MANAGEMENT/CONTROL

The preliminary research conducted during Phase I of TEC-DOC had as an objective to obtain volume and cost information to be used in the development of a detailed cost/effectiveness analysis, including the topics, volume and cost. Only this preliminary research was conducted by TEC-DOC; therefore, the generalized findings discussed below are merely indicative not conclusive. Although not specifically addressed, TM volume is implicitly involved in this discussion because of the direct relationship between volume and cost. A comprehensive and intensive research effort including a formal data collection would be necessary in order to provide the specific TM volume and cost information necessary to guide in-depth research efforts. The status of TM cost information will be discussed and the categories of TM cost information will be described. Related problem areas will be summarized to the extent revealed by the preliminary research.

(2) AUTHORITY/RESPONSIBILITY

(a) DoD Instruction 4151.9 requires each DoD Component to furnish internal TM management reporting to include programming, budgeting, funding and accounting. The Study Group could not identify a reporting system that implemented the TM management information requirement.

(b) The FYDP data base provides the single OSD source for TM financial management information. There are significant shortcomings to the use of the FYDP for TM financial management at the OSD level. These shortcomings are discussed in more detail below.

(3) FUNCTIONS

(a) GENERAL

The discussion of TM funding involves the following functions: acquisition, production and

distribution. These functions are in support of most of the ten Major Force Programs and the 2,064 Program Elements of DoD which are outputs in the FYDP. Acquisition and publishing of the initial TMs by the manufacturer for new equipment and the maintenance of these initial TMs after the applicable equipment is no longer in production, are the two major discrete aspects of TM financial accounting. For the most part, these two major aspects of TM funding are tied to two separate Defense Appropriations, Procurement and Operations and Maintenance (O&M) which are inputs to the FYDP. Consideration must also be given to those TM functions performed by nongovernment as well as government activities. Nongovernment activities account for most of the expenditures in the TM process up to the distribution function.

(b) INITIAL/IN-PRODUCTION

The types of funds for TMs procured for in-production equipment are Procurement and O&M appropriations as shown in Table 3. The regulations of the JCP require that only TM reproducible masters be procured from manufacturers along with new equipment. Publication of Camera-Ready-Copy TMs is accomplished competitively in accordance with applicable procurement regulations.

(c) FOLLOW-ON/OUT-OF-PRODUCTION

O&M appropriations are used throughout DoD to provide TMs for equipment no longer in production as shown in Table 3. The limitations concerning the competitive procurement of TM publishing described above apply to TMs for out-of-production equipment.



**TABLE 3**  
**TYPE OF FUNDING**  
**FOR TM FUNCTIONS IN MILITARY SERVICES**

| TM Function   | In-Production Equipment |      |      |              | Out-of-Production Equipment |      |      |              |
|---|-------------------------|------|------|--------------|-----------------------------|------|------|--------------|
|   | Air Force               | Navy | Army | Marine Corps | Air Force                   | Navy | Army | Marine Corps |
| I. TM Reproducible Master (Basic, Changes and Revisions)<br>-Acquisitions of Camera-Ready-Copy            | P                       | P    | P    | P            | O&M                         | O&M  | O&M  | O&M          |
| II. TM Distribution Copies (Basic, Changes and Revisions)   |                         |      |      |              |                             |      |      |              |
| A. Initial Quantity:  |                         |      |      |              |                             |      |      |              |
| 1. Publication  | P                       | P    | O&M  | P            | N/A                         | N/A  | N/A  | N/A          |
| 2. Distribution   | P                       | P    | O&M  | P            | N/A                         | N/A  | N/A  | N/A          |
| B. Follow-on Quantity:  |                         |      |      |              |                             |      |      |              |
| 1. Publication  | O&M                     | P    | O&M  | O&M          | O&M                         | O&M  | O&M  | O&M          |
| 2. Distribution   | O&M                     | P    | O&M  | O&M          | O&M                         | O&M  | O&M  | O&M          |
| P = Procurement Appropriations<br>O&M = Operations and Maintenance Appropriations<br>N/A = Not Applicable |                         |      |      |              |                             |      |      |              |

#### (4) FINANCIAL ACCOUNTING

##### (a) INITIAL/IN-PRODUCTION

Total cost by DoD Component for the acquisition and publishing of initial TMs (using Procurement appropriations) are not available for two reasons:

1 TMs are procured initially as part of an equipment/end item line item in support of FYDP Program Elements of Major Force Programs, thereby usually dispersing these costs among all the previous and on-going equipment/end item acquisitions.

2 Financial accounting of equipment/end item acquisitions follows prescribed formats, which do not always break out TMs as a subset of technical documentation. This is further complicated since these particular TM costs are incurred mostly by government contractors and their subcontractors.

(b) FOLLOW-ON/OUT-OF-PRODUCTION

The total expenditures for maintenance (revisions/changes) of TMs (using O&M appropriations) by DoD Components were not obtained by the Study Group because the Study did not proceed to the appropriate point for such an effort to be accomplished. Currently, such data is not accumulated in a single location within the DoD compound. A formal data collection would be necessary to obtain this data from the Acquisition Commands who are procuring the end items of equipment.

(c) NAVAIR FINANCIAL ACCOUNTING

Financial accounting for the complete range of Naval Aviation TM functions (i.e., for both Procurement and O&M appropriations in applicable FYDP outputs) is available from the Naval Air Systems Command (NAVAIR). The availability of this information is attributed to the fact that NAVAIR relies on the Naval Air Technical Service Facility (NATSF), Philadelphia, Pennsylvania, for management of the total TM situation in that Systems Command. NATSF is the single focal point in NAVAIR for both the acquisition of TMs using Procurement appropriations as well as for the maintenance of TMs with O&M appropriations. Elsewhere in DoD, TM financial management is conducted by separating Procurement from O&M appropriations. For Fiscal Year 1977, NATSF estimates that NAVAIR will spend about \$100 million for the acquisition, update, production, distribution and storage of TMs. Approximately 90% of this total amount will be for TM drawings and related services in support of in-production weapon systems using TMs and the NAVAIR engineering data repository using O&M appropriations. This amount is the total funded requirement for updating these TMs, and does not include shortfalls that were not funded.



(d) TM FUNDING PROBLEM AREAS

TEC-DOC preliminary research revealed several problems related to TM financial management having special significance to OSD and Component management. These problems are outlined below.

1 Lack of a focal point in each DoD Component and OSD for the entire spectrum of TM functions, including the financial accounting of this complete range of functions.

2 Projects (equipment, and research and development) involving TM functions have proliferated throughout DoD including some involving considerable dollar amounts.

3 Deficits have been accumulating for several years in the funding for the maintenance of TMs throughout DoD.

4 Available TM funds are being squeezed by recent sharp rises in contractor costs for technical writing, editing, graphics and manuscript preparation. NAVAIR reports a 30% increase recently in these costs.

5 Concern by contractors over the trend of government control of TM data (vice contractor control) brought about by conversion to new technology (e.g., automated publishing, as in the Technical Review and Update of Manuals and Publications (TRUMP)).

6 Mismatching of TM functions due to technology-driven decisions in one TM function can cause inputs/outputs of another TM function to become complicated. For example, in order to optimize efficiency, government-operated automated publishing could necessitate contractors to submit TM materiel using magnetic tape, or other nonhard copy media, to one Component while TM materiel from the same contractor is submitted in hard copy to another Component. This problem is funding related because of the pressure to reduce costs and also because a total system analysis is required for such projects.

7 Alleged lack of effectiveness of some TMs now in use. This problem is funding related because of the heavy expenses incurred for rewriting and publishing improved manuals in addition to the adverse effect on maintenance due to nonavailability of adequate TMs.

Centralized policy and project decisions are needed for TMs both in OSD and in the Components. Financial management is a key ingredient to such centralization and often means the difference between success or failure to effect policy implementation and to reduce proliferation of nonstandard projects. Future efforts to review and analyze TMs must emphasize financial management, to include the directly related matter of volume data.

### 3. CURRENT SYSTEMS

#### a. TM PROCESSES/FUNCTIONS

One of the most significant findings of the TECDOC Study effort was the diversity of TM processes existing among DoD Components. Table 4 reflects the wide range of variance of TM processes within DoD.

TABLE 4

#### TM PROCESSES

| FUNCTION               | SERVICE/AGENCY |       |     |     |     |
|------------------------|----------------|-------|-----|-----|-----|
|                        | ARMY           | NAVY  | AF  | MC  | DLA |
| Data Storage Retrieval |                |       |     |     |     |
| Automated              | T              | G/T   | T   |     |     |
| Semi-Automated         | G              | T     |     |     |     |
| Manual                 | C              | C     | C   | C   | C   |
| Composing/Formatting   |                |       |     |     |     |
| Manual                 | G/C            | G/C   | C   | G/C | G/C |
| Interactive            |                | G/T   | T   |     |     |
| Publication            |                |       |     |     |     |
| Hard Copy              | G/C            | C     | T/C | C/I | G/C |
| Microfilm              |                | G/C/T | T   | I   |     |
| Microfiche             | G/T            | G/T   |     | T   |     |
| Audio/Video Disc       |                | T     |     |     |     |
| Audio/Video Cassette   |                | T     |     |     |     |
| Distribution           | G/C            | G/C   | G/C | G   | C   |

LEGEND: G=GOVERNMENT C=CONTRACTOR T=TEST I=INTERSERVICE



It should be noted that the basic processes/functions for data storage/retrieval, composing/formatting, and publication range from a simple manual form to more sophisticated functions of data automation. The means for accomplishing these functions vary from government (in-house) to commercial contractors or a combination of both. The TM Processes Chart above also shows that the Marine Corps is an interservice user of TMs produced by other Services. About 56% of TMs used by the Marine Corps are published by other Services. Terminology used in the diagram are defined below.

#### (1) DATA STORAGE AND RETRIEVAL

Data storage and retrieval systems have as their main function the storage of data for later reuse rather than modification, and most often to maintain the information unaltered, with the exception of updating and purging. Retrieval is the term used to describe a system for recapturing data which has been maintained in a data storage file or repository. Any system that can store, index, select and retrieve data is a data storage and retrieval system.

##### (a) AUTOMATED

An automated system is one which uses Automatic Data Processing (ADP) equipment to access and retrieve data in an integral file and display the formatted data on a display device or make the data available for processing. The Navy's TRUMP system is an example of an automated system and is described in 3b(2)(b) below.

##### (b) SEMI-AUTOMATED

A semi-automated system is one that uses ADP equipment to store and retrieve data but requires human intervention at some point in the process. The Army's ASTROCOMP system is an example of this type of system which automatically processes text information but graphics are manually inserted to complete the TM publication process. This system is described in 3b(1)(a) below.

##### (c) MANUAL

A manual system is one in which the data must be manually stored and uses manual indexing

to retrieve and process the data. The desired data may be located by a combination of manual and visual operations. Currently, the majority of DoD TM systems are manual or hard copy systems.

## (2) COMPOSING/FORMATting

Composing/formatting is the processing of data to provide meaningful information in a desired form to produce a publication. Interactive composing is accomplished by utilizing a computer system to process textual and graphics data using on-line terminals.

## (3) PUBLICATION

Publication of TMs is done using the following media:

### (a) HARD COPY

Printed matter on paper which can be read with the unaided eye and can be physically handled.

### (b) MICROFILM

A fine-grain, high resolution film containing an image greatly reduced in size from the original requiring a magnification reader device.

### (c) MICROFICHE

A sheet of microfilm containing multiple microimages in a grid pattern requiring a magnification reader device.

### (d) AUDIO-VIDEO DISC

Audio-video disc is approximately the same size as the common audio long playing (LP) record. Audio and video signal information are encoded on the surface of the disc in the form of a spiral track. The advantage of the audio-video disc is its ability to store large volumes of data. This type of system is considered to be within the current state-of-the-art.



#### (4) DISTRIBUTION

Technical manuals are generally initially furnished by commercial contractors with the equipment with back up stocks being forwarded to respective Services' central publication distribution points. Government or in-house produced TMs are normally forwarded to TM users via Services' publication distribution centers.

##### b. CURRENT PROGRAMS/SYSTEMS

###### (1) ARMY

The TEC-DOC Study effort identified three basic systems being used to produce Army TMs.

###### (a) ASTROCOMP

This system is a semi-automated photo-typesetter system used for data storage, retrieval, composing and publishing. Currently, this system is being used at three Commodity Commands to produce TMs. The ASTROCOMP system processes textual data via a computer while space for graphic presentation is provided on a Camera-Ready-Copy. Photographs/drawings are manually inserted before printing.

###### (b) DEPOT MICROFORM

The Army's depot level is currently using microform for Depot Maintenance Work Requirements (DMWRs). This is the only maintenance level in the Army where micrographics for MTMs are being used as an operational program.

###### (c) HARD COPY

Hard copy technical manuals are the most widely used form of maintenance publications in the Army. Hard copy TMs are published for use at all maintenance levels.

###### (2) NAVY

###### (a) AUTOMATED DOCUMENT PREPARATION SYSTEM (ADPREPS)

The Naval Sea Systems (NAVSEA) Command system is used to publish shipboard publications. It

uses a digital computer to store information, to edit that information, and to compose it into its final format. The ADPREPS system possesses a fast turn-around capability for generating changes to Maintenance Requirements Cards (MRCs) in responding to Fleet reported deficiencies. ADPREPS has the features shown below.

- . Key entry of data off-line
- . High-speed batch input
- . Recall of loaded data at entry station
- . Entry of only new and revised data
- . Automatic search and update of key terms
- . Editor control of formats at terminal
- . Automatic preparation of front-matter (for example, table of contents, list of illustrations)
- . Better product quality (e.g., improved format, fewer typographical errors, etc.)

At present, approximately 40,000 pages are on file, and the existing configuration has an almost infinite potential for storage of text and tabular pages on magnetic tape. All graphic material must be spliced into preplanned spaces in the Camera-Ready-Copy.

(b) TRUMP

TRUMP is the Navy's most sophisticated technical publications system and is used in the Naval aviation environment. It is the most complex system used for the automation and digitization of data in the Services today. TRUMP has the capability to accept for input existing printed publications. The text is input in a form that



permits additions, deletions or changes. This is done using optical character recognition (OCR) scanning of the printed pages. The graphics are input and processed through the system and can be changed or updated via an on-line remote in an interactive mode. Output from the system is by a high-speed computer-output-microform (COM) device. The microform output can also be converted to Camera-Ready-Copy for printing.

(c) MAINTENANCE INFORMATION AUTOMATED  
RETRIEVAL SYSTEM (MIARS)

The MIARS is a microfilm system for TMs in the Navy's aviation user environment. In addition to cartridges of microfilm, MIARS features two basic types of hardware equipment: AR-15-A reader-printers and smaller AR-151A portable readers. The reader-printers have a keyboard retrieval system for mechanically locating and retrieving microfilm frames and a printer which can make up to seven dry copies of a microfilm frame. The portable readers, on the other hand, are basically projectors that magnify and display microfilm information.

(d) SHIPBOARD MICROFILM PROGRAM (SMP)

SMP is a 24X microfiche system with a manual fiche viewer used to reduce the volume and space requirements of hard copy documents, including technical manuals, in the Navy. This system was designed to convert camera-ready source documents publications to a microform production and distribution system and ultimately reduce shipboard paperwork requirements by eliminating the page change process required to keep hard copy publications current. In addition, the system provides for more rapid distribution of information to users, decreases costs, and reduces space and weight requirements aboard ships.

(e) HARD COPY

Although hard copy is still being used within the Navy's TM systems, the Navy is making extensive strides towards the development and utilization of automated and micrographic publication systems for TMs.

### (3) OTHER DOD COMPONENTS

The Air Force, Marine Corps, and Defense Logistics Agency are primarily hard copy TM producers and users; however, the Marine Corps uses Navy's microform TMs in support of its aviation maintenance program.

### 4. PROPOSED SYSTEMS

Pressures from steadily rising costs, combined with an explosion in the growth of the maintenance documentation necessary to support ever increasingly sophisticated equipment and a desire for improved technical manuals for today's users have directed attention to new technological developments. Accordingly, the Services have been conducting various studies or tests on the application of automation and micrographics techniques to the technical manual system. These tests, and proposed systems resulting from these tests, have not been well coordinated within or among the Services, or monitored by OSD.

#### a. STUDIES/TESTS/PLANNED SYSTEMS

The basic processes in technical manual systems revolve around the functions of source data acquisition/storage/retrieval, production, update, distribution, use and management control of these functions. The various studies or tests being conducted by the Services involve one or more of these processes.

#### (1) ARMY

Army tests have been limited to microform usage for technical manuals at the user level. Currently two tests are being conducted.

##### (a) IMPLEMENTATION OF MICROPUBLISHING FOR ARMY CONCEPT AND TECHNOLOGY (IMPACT)

The Army's printing/publishing costs approximate 30-40 million dollars a year and are constantly escalating. In order to alleviate this situation a test was conducted to evaluate micropublishing in terms of costs and, secondarily, user acceptance of a microfiche product. The field testing of IMPACT was designed to test the usability of microfiche in a tactical type field environment.



Several types of 24X portable microfiche viewers were leased and issued to Army brigade test units. An evaluation was made of user acceptability of the microfiche media versus hard copy for several types of publications, including TMs. The results of this test are still being staffed, and cost/effectiveness analysis and other evaluation results have not been released.

(b) AN/TSQ-73 MICROFICHE TEST

The Army conducted a special microfiche test of technical manuals for the AN/TSQ-73 weapons system. The AN/TSQ-73 is a functioning weapons system contained in a tactical mobile van to be manned by field combat troops. The system integrates all radar within an area. It is a compact, self-contained system having limited storage space.

The field user test was conducted using technical manuals for the operation and maintenance of the system in a tactical field environment. The test objective was to determine the suitability of microfiche to support the system considering usability, space and cost factors. The test plan includes testing of 24X microfiche for both portable and built-in viewers, and a comparison with TMs in hard copy mode.

(2) NAVY

(a) GENERAL

The Navy has identified and has been attempting to solve a number of problems and deficiencies associated with technical manuals. A partial list of problems is shown below.

1 Hardware systems are becoming more complex requiring a greater number of documents of a more complex nature.

2 Costs of producing this documentation are escalating.

3 Readability of current TMs by today's enlisted man is questionable.

4 Cost and funding data are not available.

5 There are numerous TM specifications and each Acquisition Command has its own specifications.

6 Hard copy TMs are too big and bulky.

7 There are usability problems in that many manuals are not up-to-date and not suitable for maintaining the equipment for which they were intended.

8 Policies and procedures vary for acquisition, reviewing/validating, updating, numbering and indexing TMs among Acquisition Commands.

In order to remedy this situation, the Navy established a number of independent efforts by different Hardware Systems Commands to address various aspects (portions) of the problem. An Ad Hoc Committee was established to review the above problems and efforts, which concluded that a centralized effort was required to measure the magnitude of TM problems, to rank their importance and to develop an integrated TM system. This resulted in the establishment of the Navy Technical Information Presentation Program (NTIPP).

#### (b) NTIPP EFFORT

This program was established to give project and program managers and others in authority, at all levels, specific guidance for decision making in the development, procurement and use of TMs and to provide a coordinated systems approach to development and management of the Navy's TM system. This effort considers and/or coordinates the various independent efforts under an "umbrella" concept.

#### 1 OBJECTIVES

The general objective of the NTIPP is to provide an integrated system to produce, revise, distribute, retrieve and control TMs for Navy equipment. Specific objectives include:



a Collect, evaluate and format operator and maintenance technical data from the various Hardware Systems Commands.

b Produce and update TMs using various formats and media which will optimize operability, maintainability and availability of equipments.

c Manage and control distribution of TMs.

d Monitor utility of TMs and evaluate and correct deficiencies.

e Collect, analyze and control costs of production, distribution and control of TMs.

## 2 APPROACH

The program has five phases occurring sequentially over a six year period ending in 1981. These phases are outlined below.

a Program and problem definition

b Concept formulation

c System design, pilot testing and prototype specifications development

d Prototype development and test

e Prototype operation and production specification development

## (c) RELATED STUDIES/EFFORTS

The NTIPP project was established to remedy the growing problems with Navy TMs and to consider and/or coordinate the various independent studies/efforts undertaken individually by the Hardware Systems Commands. Some of the major efforts are briefly described below:

1 PERSONALIZED PORTABLE MICROFORM  
DISPLAY SYSTEM (PPMDS)

The objective of this study is to develop a rugged, portable, high image quality microform viewer system using concepts developed for conventional microform technology, as well as untested innovative techniques for high density storage and display of information for use in maintenance, operation, training and administrative environments. Two firms have been awarded contracts to produce 25 prototype viewers each. The prototypes will be field tested to determine their cost/effectiveness for use in the specified environments. Final specifications for production models will be based on the results of the tests.

2 FLEET INFORMATION STORAGE AND  
RETRIEVAL (FISAR)

This Study was conducted by the Naval Electronics Laboratory Center (NELC) in 1973 to explore modifications for improving present information handling systems for destroyers. These type ships are estimated to contain about 3,600 TMs with an estimated storage requirement per ship of about 162 cubic feet. Recommendations from this Study are shown below.

- a Develop a Fleet oriented consolidated subject index
- b Provide a more logical record structure
- c Use microfiche for technical publications except for selected printed copies
- d Establish a Fleet library
- e Use chemical flood safes for emergency destruction
- f Put supply catalogs and lists on microfiche
- g Consolidate directives



### 3 SHIPS TECHNICAL DATA MANAGEMENT INFORMATION SYSTEM (STEDMIS)

The Naval Sea Systems Command sponsored this Study in 1974 to provide management information on technical documentation and its relation to the effectiveness of ships, systems and equipments. This system is the focal point for documentation information as it pertains to the ship and its equipment and system life cycles. The system describes the identification, applicability, status, quality, location, format, content and cost of technical documentation.

### 4 STANFORD RESEARCH INSTITUTE (SRI) STUDY

This project was established to analyze the requirements of and conduct a cost/effectiveness analysis of the TMS for NAVSEA that are being published by the NAVSEA Data Support Activity (NSDSA) at Port Hueneme, California. A preferred and alternate automated publishing system for the production, inventory control, distribution and update of NAVSEA TMS will be recommended.

#### (3) AIR FORCE

##### (a) GENERAL

The Air Force Technical Order (TO) system includes about 100,000 TOs with approximately 10 million pages. Each year about 4,000 new TOs and 36,000 changes are issued with one billion distribution pages. The cost of this technical data is estimated at 100 million dollars per year. The Air Force has been experiencing many of the same problems as the Navy. An abbreviated list of these problems is shown below.

1 The volume and complexity of TOs is increasing at a rate corresponding to the volume and complexity of equipments.

2 TOs contain deficiencies and require improvements in quality and style for current technician level in Air Force.

3 TOs are out-of-stock and there are funding deficiencies for reprints, changes and new TOs.

4 TO system technology is outdated in terms of timeliness, adequacy of data content, format and media, and state-of-the-art.

(b) AUTOMATED TECHNICAL ORDER SYSTEM (ATOS)

1 CONCEPT

ATOS is a long range program to develop a fully automated publishing system. The program is scheduled for the phased definition of requirements, development, documentation and incremental implementation over a fifteen year period. The Data Automation Requirement (DAR) provides for an enhancement of the Automated Text Composition System (AUTOTEC) undergoing service test at Oklahoma City Air Logistics Center (OCALC) with limited preparation of TOs using automated text preparation and merging of graphics and mechanization of Illustrated Parts Breakdown (IPB) Manuals produced by Ogden Air Logistics Center (OOALC) as well as current programs used for management information requirements determination and distribution control.

2 OBJECTIVES

The basic objective is to correct the problems cited above through the application of advanced automation and micromation techniques to the preparation, storage, update, management and retrieval of technical data. Specific objectives include:

a Develop an automated system for digitization of text and graphic data in a standard format for automated acquisition of data from contractors, storage, update, production, publication and distribution of TOs;

b Increase standardization of TOs to military specifications;

c Reduce paper copies and nonstandard forms of media;

d Reduce storage space requirements for TOs;



e Reduce maintenance search and retrieval time to obtain data;

f Provide more rapid update and distribution of technical data to provide more timely support; and

g Provide an automated data bank for trouble shooting and diagnostic assistance for maintenance.

### 3 APPROACH

The DAR outlines four alternatives for the accomplishment of Air Force objectives.

a Current System which consists primarily of contractor prepared hard copy TOs to support all systems during acquisition and most out-of-production systems.

b Automated Input Document Update System (AIDUS) similar to the Navy's TRUMP System.

c In-House Automatic Data Processing Equipment (ADPE). Government owned/leased and operated system envisioning use of a large scale IBM S370 type computer in conjunction with AIDUS type Information International Inc. (III) optical scanners, composers and output devices for a fully automated data base storage/retrieval and publication system.

d Contractor conversion of entire hard copy TO data base (text and graphics) to a digitized form. Contractor support would include data capture, update, changes and revisions to TO system for a five year period. At that time the Air Force would determine whether to continue contractor support or to acquire and operate the necessary equipment in-house. It is understood that Information Handling Services (IHS) has presented a technical proposal to the Air Force to conduct a test using the C-130A aircraft at Warner Robins Air Force Base at an estimated cost of 250,000 dollars. In addition, IHS is proposing to convert the entire TO system to a digitized data base and to operate and maintain it

for the Air Force at an estimated cost of 60 to 100 million dollars. Current status of the contractor proposal as well as the DAR is unknown.

(4) MARINE CORPS

The only known test being conducted by the Marine Corps is a limited portable microfiche viewer test project at the user level at the Marine Corps Base, Quantico, Virginia. Status of this test was not known at the time of preparation of this report.

(5) DEFENSE LOGISTICS AGENCY (DLA)

No testing has been conducted by DLA and none is planned.

b. OTHER RELATED PROJECTS

The studies, tests or proposed systems discussed above are those being conducted by the Services that are partially or totally within the scope of the TEC-DOC Study; however, the study group came across other efforts that dealt primarily with TM data bases, content and/or format. Some of these efforts were OSD-sponsored and some were initiated by the Services themselves. Even though these studies cover functions excluded by the TEC-DOC Study, the studies are considered pertinent, since these functions are properly related and important to the total TM systems management concept.

(1) MANAGEMENT REVIEW OF MAINTENANCE TRAINING AND PERFORMANCE AIDS (MRMTPA)

(a) INITIAL CHARTER

An ASD(I&L)WR memorandum of 4 November 1976, established a Management Review to achieve operating and support cost reduction and maintenance improvement. The purpose of this effort was to review the Services' plans and programs for field demonstration and evaluations of technology and evaluations of new policy for technical manuals for maintenance personnel of both fielded and new weapons systems or equipment, including directly supporting Research and Development (R&D). Emphasis was on the development of a common technical data base that could be used for training and field maintenance.



(b) PLAN AND SCHEDULE

1 SCHEDULE

By ASD(I&L)WR memorandum of 30 December 1976, the Management Review evolved into a review of maintenance training and performance aids and was scheduled for 1-3 February 1977. This conference took place at the David Taylor Naval Ship Research and Development Center, Carderock, Maryland.

2 PURPOSE

The scheduled purpose of this conference was to discuss, assess and/or document the areas listed below.

- a DoD policy
- b Recently available technology
- c Service plans and programs for applications and field evaluations of technology
- d Current and planned RDT&E
- e Interservice exchange of information

3 SCOPE

The review was scheduled to cover the areas listed below.

- a Job task analysis
- b Related task oriented training
- c Technical manuals
- d Other aids to improved job performance of maintenance personnel
- e The development and use of a common technical data base

(c) CONFERENCE RESULTS

1 APPROACH

The first two days of the conference were devoted to presentation of briefings by each of the Services. The final day was devoted to discussion of the briefings. Orientation of the conference appeared to revolve around the exchange of information of the uses, impact and cost of technical data bases and job performance aids for training. Copies of the Service briefings and a summary of the major points discussed were to be provided to each of the attendees.

2 DISCUSSION

There were a number of issues and matters discussed at the conference. Major points of discussion are summarized below.

a Existing technology base in technical manuals should be implemented in the acquisition of new systems and in the product improvement of systems already operational.

b Management policies which might have to be changed to facilitate implementation of the existing technology base were briefly discussed.

c The lack of quantitative cost and performance data which could be used to influence broader implementation of new technology technical manuals, particularly on training and personnel subsystems, was a common concern.

d The establishment of ad hoc task groups to develop white papers on the three areas listed below. Coverage is to include what we know today, what we are currently doing with this knowledge, and what needs to be done in the development and implementation areas.



- Maintenance Job Aids Technology
- Cost/Benefit Data in Job Aids
- Applicability of Job Aids and the Impact on the Personnel and Training Systems

e The Army was encouraged to utilize the Air Force expertise and experience on manuals for the C-141 aircraft during the Army's planning and implementation phases of its Improved Technical Documentation and Training (ITDT) program.

#### (d) SUMMARY

The conference was a forum for the exchange of information through a series of briefings and subsequent discussion. The emphasis was on the uses, impact and cost of job guides for training. Certain general issues or points were discussed and it was indicated that ad hoc groups would be convened to develop papers on Job Aid Technology, cost and applicability to personnel and training systems. The timing, charter, structure and definition of the ad hoc groups and issues were not specified, and the future course of the Management Review was to be developed subsequent to the conference.

#### (2) INTERSERVICE GROUP FOR EXCHANGE TECHNOLOGY ON TECHNICAL MANUALS (IGETTM)

A Draft Joint Service Regulation (AFR 66-19) advised of the intent to establish an Interservice Group for the purpose of exchanging new technology related to TMs in compliance with DoDI 4151.9 (TM Management). The primary function of the Group will be to provide a vehicle for the exchange of information regarding TM technology and management in the areas listed below.

- (a) TM Format
- (b) TM Readability
- (c) Information Presentation Methods
- (d) Media
- (e) Distribution Methods
- (f) Cost

(g) RDT&E Efforts

(h) Other Related Areas

It was intended that the Group meet once a year to exchange briefings on new concepts and approaches toward improved management of TMs; however, ASD(I&L)WS memorandum of 9 December 1976, subject: Technical Manual Management Program, delayed the publication, distribution and implementation of the Joint Regulation, and establishment of the Group. The restriction on publication of the Joint Regulation was subsequently removed by ASD(I&L)WS memorandum of 5 April 1977, subject: Technical Manual Management Program.

(3) IMPROVED TECHNICAL DOCUMENTATION AND TRAINING PROGRAM (ITDT)

(a) PROBLEM

The Army has been experiencing problems in maintaining equipment because of the content and information presentation method in technical manuals and because current training materials and methods were not adequate. It was felt that neither the TMs nor the training was oriented to maintenance requirements.

(b) CONCEPT

The Army has instituted a new training philosophy compared to what traditionally has been done in the training field. Since soldiers spend 90% of their time in units, it was determined that only training which cannot adequately be taught in the units should be taught in the Service schools. To implement this philosophy, the Army decided to develop simplified job performance aids and guides that the soldier can use on the job, to perform both maintenance and training at the unit level.

(c) APPROACH

To accomplish this philosophy, job and task oriented training and maintenance requirements are assessed at the time of acquisition of the end items of equipments and technical data is acquired to provide a



common technical data base to be used for maintenance and training. The Job Performance Aid (JPA) approach, is used which utilizes step-by-step procedures with simple illustrations supported by easy to read text. Key features include:

1 Technical documentation development is based upon an analysis of job and task requirements.

2 Material is developed with the maintainer and work conditions in mind, at the time of acquisition of the equipment and associated technical data.

3 Technical information is presented in job sequence and organized for accessibility.

4 Training and technical documentation are integrated.

5 Technical Manuals and training packages are verified by users under realistic conditions prior to acceptance.

#### (4) AIR FORCE R&D PROGRAM FOR IMPROVEMENT OF TECHNICAL DATA

The Air Force has a number of different but related research and development efforts to improve technical data for use in maintenance and maintenance training. These efforts are briefly described below:

##### (a) JOB PERFORMANCE AIDS/JOB GUIDES (JPAs/JGs)

###### 1 OBJECTIVE

Project 1194 is an R&D project to develop, test and evaluate improved TOS for troubleshooting. This Study also incorporated previous testing performed on Job Guides.

###### 2 APPROACH

The approach was to test two types of troubleshooting aids with TOS currently in use:

shooting Aids (FPTA) a Fully Proceduralized Trouble-

(LTTA). b Logic Tree Troubleshooting Aids

### 3 EVALUATION CRITERIA

Standard TOs currently in use will be compared with FPTAs and LTTAs in terms of the following criteria:

a Cost,

b Technical accuracy and

c Effectiveness.

## (b) ADVANCED SYSTEM FOR HUMAN RESOURCE SUPPORT OF WEAPON SYSTEM DEVELOPMENT

### 1 OBJECTIVE

Project 1959 was established to demonstrate an overall technology for controlling human resource requirements through the definition and development and integration of requirements using a consolidated common data base.

### 2 APPROACH

The Study has four phases:

a Collection of human resources  
data on existing systems;

b Application of human resource  
technologies in basic design;

c Analysis of maintenance personnel  
availability; and

d Test and evaluation.



### 3 METHODOLOGY

Application of human resource technologies to the following areas of considerations:

- a Equipment design trade-offs,
- b Maintenance manpower modeling,
- c Improved technical data,
- d Instructional systems development and
- e Systems ownership costing.

### 4 EXPECTED RESULTS

Consolidated single source data base to eliminate or reduce duplication of data requirements among users. Data to be provided at various levels of detail for different types and levels of users, such as, depot, intermediate and organizational levels of maintenance.

### 5 FUNDING

An estimated total of 1.5 million dollars R&D funds for all phases of the Study to be expended from Fiscal Year 1976 through 1979.

#### (c) AUTOMATED STORAGE/RETRIEVAL SYSTEM

##### 1 OBJECTIVE

This R&D project was established to design a human factors oriented automated system for the storage and retrieval of technical data.

##### 2 REQUIREMENT

This project provides support for the ATOS described above, and establishes a foundation for Project 2362 (Computer Based Maintenance Aids for Technicians) described below.

### 3 APPROACH

The following tasks are included in the project:

a Define technician performance and technical data use requirements for all Air Force maintenance environments;

b Determine human factors characteristics of an automated system required to meet performance requirements;

c Determine hardware/software requirements;

d Survey latest hardware/software technology and

e Develop system specification.

### 4 FUNDING

Funding requirements estimated at 92 thousand dollars for Fiscal Year 1977 through 1978.

(d) COMPUTER BASED MAINTENANCE AIDS FOR TECHNICIANS

### 1 OBJECTIVE

Project 2362 was established to develop and evaluate new concepts, techniques and equipment for computer based maintenance aids.

### 2 APPROACH

Tasks included in this project are:

a Develop a prototype automated delivery system based on performance specifications. Project in support of ATOS described above is in support of this task;

b Develop a portable adaptive device for flightline and shop application; and



operational system. . c Evaluate a and b above on an

### 3 FUNDING

An estimated requirement of 1.5 million dollars in R&D funds for Fiscal Year 1978 through 1980.

#### (e) LOGIC MODEL DIAGNOSTIC TEST SET

### 1 GENERAL

The Logic Model Diagnostic Test Set is a mini-computer with a hand-held control that stores diagnostic data on interchangeable floppy disks. It accepts test point data and develops and displays next step tests. The test set which was developed by the Army Air Mobility R&D Lab is portable and can be used for troubleshooting by less experienced technicians at all levels of maintenance.

### 2 OBJECTIVE

The objective is to reduce the numbers of automatic test equipment needed and to simplify and improve troubleshooting.

### 3 APPROACH

The Air Force approach is to evaluate and compare the test set with JPAs using the same equipment and using the same people involved in the Project 1194 test of JPAs.

### 4 FUNDING

The project is currently not funded; funds are being sought for the project.

## ANALYSIS AND CONCLUSIONS

### 1. ASSESSMENT

The TEC-DOC Study confirmed the problem in TM systems is one of diversity and complexity; but in addition,

ascertained that the problem did not stop there. Redundancy, overlap and deficiencies were noted not only in the end product, technical manual outputs themselves, but also in the management and operational systems responsible for producing, distributing, updating and using TMs. The solution to the problem is the proper definition of the end objective, definition or identification of the requirements and vehicle to use, and the proper approach to satisfy the defined requirements and to attain that objective. With this in mind, the remainder of this paper will address these factors in terms of an analysis of current and proposed management and operation systems, programs and efforts and recommend a solution to the problem.

a. ULTIMATE OBJECTIVE

The original objective was to determine, develop and propose a cost/effective TM System. More properly stated, the ultimate objective is or should be

-----COST/EFFECTIVE MAINTENANCE-----!

In other words, the basic requirement should be to provide the TYPES OF TECHNICAL MANUALS to the user that will permit the user to increase equipment availability by performing the maintenance function:

- \* IN THE LEAST AMOUNT OF TIME,
- \* WITH THE LEAST AMOUNT OF EFFORT and
- \* AT THE LEAST COST.

The Study Group review revealed that technical manuals, TM Systems or portions of TM Systems could not be studied in isolation, but must be considered as an integral part of the maintenance environment.



b. REQUIREMENT

In order to accomplish these objectives, we must address the

- \* WHO
- \* WHERE
- \* WHAT
- \* HOW

of the situation.

(1) WHO --- is ALL users of maintenance and operation technical information, including:

- \* MAINTAINER of the equipment,
- \* OPERATOR of the equipment and
- \* TRAINER of the maintainer and operator.

(2) WHERE --- is maintenance anywhere --- at all levels and locations:

- \* DEPOT LEVEL,
- \* INTERMEDIATE LEVEL and
- \* ORGANIZATIONAL LEVEL --- IN THE FIELD.

(3) WHAT --- is an improved technical information presentation program output in terms of:

- \* CONTENT,
- \* FORMAT AND PRESENTATION MODE,
- \* MEDIA,
- \* TIMELINESS and
- \* USABILITY.

(4) HOW --- is through the application of logical and systematic analysis of all aspects of the scope (range and depth) of the problem by qualified analysts.

#### c. APPROACH

To remedy this problem or situation, what is needed is a total systems approach that will address the requirement in terms of the TM Processing Systems and TM Management.

##### (1) TM SYSTEMS

The current and planned operational TM Systems must be examined in terms of all users of TM data and consider all the processes/functions and tasks related to the acquisition, production, distribution and use of technical data in order to obtain the ultimate objective of cost/effective TMs.

Table 5 depicts the TM System in terms of the applicable functions and tasks. Each and every one of these functions and tasks must be considered in order to develop an improved TM System.



TABLE 5  
TM SYSTEM SCOPE

| FUNCTIONS/PROCESSES   | TASKS   |
|---|---|
| SOURCE DATA   | <i>Develop</i><br>STORE<br>MAINTAIN   |
| PRODUCTION  | RETRIEVE<br>COMPOSE<br>OUTPUT<br>* <i>Content</i><br>* <i>Format</i><br>* <i>MEDIA</i><br>PUBLISH |
| DISTRIBUTION  | INDEX<br>STORE<br>RETRIEVE<br>TRANSMIT  |
| USER APPLICATIONS<br>OPERATOR<br>MAINTAINER<br><i>Trainer</i> | STORE<br>RETRIEVE<br>USE<br>* <i>LEVELS</i><br>* <i>ENVIRONMENT</i>                               |
| <i>Control</i>  | <i>Test</i><br><i>Evaluate</i><br><i>Human Factors</i>  |

NOTE: Italicized items were excluded from the scope of the TEC-DOC Study.

(2) TM MANAGEMENT

TM management is exercised by various organizational levels within the Office of the Secretary of Defense itself as well as within the DoD Components. These organizations manage or control the TM Systems by exercising their responsibilities, functions and authorities through the issuance of directives, specifications and definitions that establish policy and procedures for TM management, operation and control.

In addition, the PPBS plays a large role in the final product, the technical manual. The analysis section below will separately discuss the TM Processing System Management.

## 2. COMPARATIVE ANALYSIS

### a. TM SYSTEMS

#### (1) DISCUSSION

The TEC-DOC Study Group evaluated and compared current and proposed DoD Component systems and efforts with the objective, requirement and approach outlined above, considered necessary to correct existing TM problems and to provide an improved and effective TM product. The DoD Components have recognized a general problem with the usability of TMs and have attempted to isolate, identify and take steps to correct these problems.

A number of studies and tests were established by the DoD Components in an attempt to improve technical manuals. Some efforts have also been sponsored by the OSD as DoD Studies such as TEC-DOC or as Interservice efforts to review or survey the TM System rather than to conduct a detailed analysis. The Service Studies have individually addressed one or more of the TM functions or tasks within the processes, but generally do not consider the interaction of these processes and tasks within the total systems environment. Two of the DoD sponsored efforts merely provide a forum for the exchange of information and do not provide for an in-depth analysis of any facet of the TM System. Forums for the exchange of information provide a basis for advising of system problems and of current and planned efforts to improve systems, but do not in and of themselves possess the necessary structure or capability for correcting problems or creating system improvements.

The TEC-DOC Study also excluded from its scope certain functions or processes, and associated tasks, which are highlighted by italics on Table 5. These tasks were excluded because certain skills were not available to



perform the tasks or because they were not within the province of the study sponsor. After completing Phase I of the study, the TEC-DOC Study Team recognized the necessity for consideration of certain elements, which were initially excluded, if a truly systems oriented study were to be conducted which would result in qualitative and quantitative improvements to the technical information required for cost/effective maintenance, including:

- \* Acquisition and development of source data as well as physical processing of this data,

- \* TM content and format as well as media,

- \* Consideration of the trainer as well as the operator and maintainer and

- \* Development, test and evaluation of alternatives in the user environment with a consideration of the involvement of human factors analysis.

The TEC-DOC review of current and proposed systems and programs in the Department of Defense revealed one well planned and organized effort to consider all the facets in the acquisition, production, distribution use and control of technical manuals and their evaluation in terms of the effect and cost on maintenance. This is the Navy's Technical Information Presentation Program (NTIPP), research and development project.

The scope of the NTIPP Project includes all the technical publications required by the operator, maintainer and the trainer; and includes all the total systems functions from the acquisition and development of source data to the output of the final product required by the user; and the evaluation of the effectiveness of that product in terms of cost, timeliness, and usability, including an evaluation of human factors involved.

The approaches and methodology of TEC-DOC and NTIPP are similar except for the scope (range and depth) of the efforts. An analysis of the respective tasks of the two efforts are shown below.

# TASK ANALYSIS

|     | TASK                                     | TEC-DOC   | NTIPP     |
|-----|--|-----------|-----------|
| [1] | PROBLEM DEFINITION                       | COMPLETED | COMPLETED |
| [2] | ANALYSIS OF CURRENT AND PROPOSED SYSTEMS | JUN 77    | FEB 77    |
| [3] | DETERMINE ALTERNATIVES                   | JUL 77    | APR 77    |
| [4] | COST/EFFECTIVENESS ANALYSIS              | AUG 77    | SEP 77    |
| [5] | PROPOSED SYSTEM                          | SEP 77    | OCT 77    |
| [6] | DETAILED DESIGN AND COMPONENT TEST       | -----     | JUN 79    |
| [7] | PROTOTYPE DEVELOPMENT AND TEST           | -----     | JUN 80    |
| [8] | PILOT OPERATION                          | -----     | JUN 81    |
| [9] | SYSTEM IMPLEMENTATION                    | -----     | JUL 81    |

The study tasks of the two studies are very similar in terms of type of tasks being performed and time phasing currently projected for the completion of these tasks. The DLAO charter/mission normally provides for the completion of a study after performance of analysis of alternatives considered and recommendation for system proposal. Since DLAO is not an R&D organization, development and testing of prototype systems and hardware are not performed; the Office is not staffed to perform the functions listed in Tasks [6] to [9]. The dash line represents the termination point for the normal completion of a DLAO Study and the proposed completion of the TEC-DOC Study.

Since the NTIPP effort is a total R&D Project, it provides for the development of a system proposal and the development of a prototype system and equipment, and the actual testing out of this system and equipment in the user environment, coupled with a pilot operation, to insure the adequacy of the proposal prior to system implementation.



A comparative analysis of the functional study tasks for the two efforts indicates that both the studies are considering current and proposed systems, and the state-of-the-art throughout DoD and industry. As related to the respective scopes of the two efforts, however, the TEC-DOC Study has a charter to determine the requirements for the entire Department of Defense while, although the NTIPP is considering in their analysis phase the current and proposed systems of other Services its charter requires NTIPP to develop and propose a system to meet Navy requirements only.

A comparison of the relative resources being expended by the TEC-DOC and NTIPP efforts shows that the TEC-DOC effort is utilizing Government personnel only and is O&M funded at an estimated 150 to 250 thousand dollars. The NTIPP Project is funded with R&D funds which are being expended to obtain the services of both in-house Government specialists and, through the use of R&D contracts to industry, to accomplish some of the assigned tasks. Currently, estimated funding for the NTIPP Project is approximately 10 million dollars.

It should be noted that the Air Force is spending approximately three to four million dollars in R&D funds for its individual R&D efforts; and the Army is spending over 10 million dollars in O&M funds in development and testing on its ITDT Program.

## (2) FINDINGS AND CONCLUSIONS

There is a large measure of redundancy between the TEC-DOC and NTIPP studies, particularly as relates to the survey of current and proposed TM systems and the development of systems proposals. There is also considerable overlap and/or redundancy between TEC-DOC/NTIPP and other related OSD/Service efforts; however, the NTIPP effort is a complete research and development project based upon a total systems approach to improve the Navy TM system, not only for developing a system proposal, but for developing and testing a prototype system to insure its applicability/usability. It is the only known Study that satisfies the requirement for a logical and systematic study encompassing the objectives, requirements, scope and approach, described under paragraph 1 (ASSESSMENT) above, considered necessary to

provide significant improvements to the technical information presentation program.

It is concluded that there should be a single systems approach in order to achieve the OSD goal of an improved user oriented TM system and that a current study project is using such an approach.

b. TM MANAGEMENT

(1) DISCUSSION

The review of technical manual management within the Office of the Secretary of Defense and DoD Components revealed the same aspect of diversity, complexity, redundancy and overlap that was witnessed in the operational TM systems. This was not surprising, since the operational systems were spawned from and by the TM management levels through the directives, specifications, definitions promulgated by these organizations to exercise the responsibilities, functions and authorities of the different levels of management. Section 3, Discussion Part of the report, covered TM Management in detail. The following section summarizes the findings and provides conclusions tailored to key instruments of management.

(2) FINDINGS AND CONCLUSIONS

(a) ORGANIZATIONS

A number of organizations within OSD and the Components have overlapping and/or redundant functions, responsibilities and authorities either through actual mission assignment or through assumption in practice. This has either caused or permitted planning the development and/or implementation of conflicting or redundant policies, programs and systems.

A TEC-DOC Study Review of the OSD charters and mission/organization statements indicates that the predominant interest in TM development, distribution and use within OSD is in the OASD(I&L). At present this interest is dispersed among several of the OASD(I&L) organizations (See Figure 2).



Current DoD/Component Charters and Mission/Organization Statements should be reviewed and a single focal point should be designated within the OASD(I&L) and corresponding Component headquarters level to consolidate and coordinate all actions related to the TM management and TM systems related to the R&D, acquisition, data/storage/retrieval, production, distribution and use of TMs.

(b) DEFINITIONS

Current definitions of technical data, information and manuals are conflicting and vague.

Definitions for technical data, information, and manuals should be reviewed and revised as necessary. Consideration should be given to a general definition for technical manuals with subsets for classification of manuals as maintenance, operator, training or administrative manuals.

(c) DIRECTIVES

Current DoD Directives assign partial or overlapping functions, responsibilities and authorities to different organizational components.

The functions, responsibilities and authorities contained in DoD Directives pertaining to TM management should be reviewed and revised to eliminate duplicate and overlapping assignment of responsibilities.

(d) SPECIFICATIONS

There are hundreds of specifications governing the content, format and media for technical data and information. These specifications have been generated and/or coordinated by various organizational levels within and between the Services and DoD.

A project should be established to review all Technical Data/Information/Manuals specifications currently planned or in use to determine whether these specifications can be improved or reduced through consolidation or elimination.

(e) FUNDING

The study group found it very difficult to ascertain the amount of money spent on or cost of technical manuals. Different types of funds are used and different organizations are responsible for budgeting and funding for initial acquisition and publication of in-production and out-of-production equipment. Current contracting, budgeting and accounting procedures do not always require isolation and identification of TM costs.

Contracting, budgeting and accounting procedures should be revised to permit better identification of costs and improved budgeting and funding of TMs.

RECOMMENDATIONS

The following recommendations are submitted for approval and coordination:

1. That the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) and Director of Defense Research and Engineering provide a charter to the Navy to expand the Navy Technical Information Presentation Program Project to include the consideration of DoD technical manual requirements for all DoD Components.
2. That the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) and Director of Defense Research and Engineering designate a DoD Project Manager for the Technical Information Presentation Program Project whose responsibilities will include consideration and coordination of DoD Component requirements and compatibility of proposed systems.
3. That the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) and Assistant Secretary of Defense (Comptroller) defer funding for acquisition of equipment or services for automated technical manual publishing and user retrieval equipment that cannot be amortized within the time frames for completion of the Technical Information Presentation Study.



4. That the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) designate a single office within ASD(MRA&L) responsible for technical manual program management throughout DoD.

**NOTE:** References to ASD(I&L) throughout the Report were not changed to ASD(MRA&L) since the organizational Components and respective functions referenced were under the cognizance of ASD(I&L) during preparation of the Report.



ASSISTANT SECRETARY OF DEFENSE  
WASHINGTON, D.C. 20301

APPENDIX A

INSTALLATIONS AND LOGISTICS

10 Sep 76

MEMORANDUM FOR Assistant Secretary of the Army (I&L)  
Assistant Secretary of the Navy (I&L)  
Assistant Secretary of the Air Force (I&L)  
Director, Defense Supply Agency

SUBJECT: Analysis of Methods for the Production, Distribution and Use  
of Technical Manuals

Major technological advances have been made over the past decade in the areas of printing, publication and the related fields of data micromation and automatic data processing. Many in Defense are seeking to take advantage of these advances to improve the production, updating and mechanisms for the use (readers/printers) of their technical manuals and thereby improve user effectiveness and reduce costs. It appears these worthy objectives could be significantly enhanced through better coordination with attention directed toward eventual standardization of a best system(s) where practical.

To establish a base for improved coordination and for follow-on efforts, the Director of the Defense Supply Agency is requested, through his Defense Logistics Analysis Office (DLAO), to undertake a definitive review and analysis of the methods and equipments for the production, update, distribution and use of technical manuals. The study should include identification and assessment of the Services' current practices and future plans and should recommend alternative methods and systems having the most promise from an overall Department of Defense viewpoint. The accompanying Study Plan calling for completion by June 1977 is approved.

Service cooperation with DLAO and full support of its efforts are essential to assure the study objectives are fully met. Your attention, in this regard, is invited to Paragraphs F and G of the Study Plan for details on contact points and Service briefings required.

Attachment  
a/s

(Signed)  
JOHN J. BENNETT  
Acting Assistant Secretary of Defense  
(Installations and Logistics)



STUDY PLAN  
for  
A DOD REVIEW AND ANALYSIS  
OF THE METHODS FOR PRODUCING, DISTRIBUTING  
UPDATING, AND USING TECHNICAL MANUALS

**A. PURPOSE**

The intent of this review and analysis is to identify the various means for producing, distributing, maintaining, and using technical manuals within the DoD and to evaluate these with a view toward identifying the best method for producing, distributing, and maintaining such publications.

**B. BACKGROUND**

"TECHNICAL MANUALS" are publications containing instructions designed to meet the needs of personnel engaged in or being trained for the operation, maintenance, service, overhaul, installation, test, or inspection of specified items of equipment and materiel. Prior to the mid-1950s virtually all technical publications were produced, distributed, and used in "hard copy," printed form. During the latter part of the '50s' and through the '60s' to present, advances in Micromation and Automatic Data Processing (ADP) technology led to modified publication, distribution, and usage capability.

As the newer techniques emerged, the DoD Components, and sub-Components (and/or their respective commercial contractors) publishing, distributing, and updating technical manuals developed their own systems for accomplishing these tasks. As a result technical manuals are now produced, distributed, updated, and used in a multitude of ways, applying (1) hard copy, printing and distribution techniques, (2) ADP tape reproduction and distribution techniques, (3) Computer Output Microform (COM) production and distribution techniques, and (4) combinations of these. Each technique has its own characteristics which impact on technical manual production, update, and use.

At the organizational level where equipments are used and/or maintained, the operating and maintenance personnel are confronted with a proliferation of technical manuals--and the means for updating and using them. These include hard copy, printed publications, requiring periodic page or word changes; cartridge microfilm, requiring cartridge exchange; and microfiche requiring replacement.

Where users of technical manuals are supplied by several producers, the users may be exposed to multi-media, requiring variable reader/viewer, printing, and reproduction equipment and variable update techniques.

The proliferation of technical manual production, distribution, update, and usage is considered a problem--especially at the equipment operating and maintaining organizational level. The concern involves (1) the effectiveness and (2) the economy of using several methods simultaneously.

As a result of the foregoing factors this review and analysis is generated as a route toward documenting the technical manual production and distribution systems and seeking a better, or best, way for distributing, updating, and using such manuals.

#### C. OBJECTIVES

Within the overall purpose of this assignment, the review and analysis team will:

1. Survey and document the current systems for the storage, retrieval, production, reproduction, distribution, update, and use of data contained in technical manuals;
2. Survey and document the equipments (e.g., printers, reproducers, viewers) used to store, retrieve, produce, reproduce, distribute, update, and use the data contained in technical manuals; (observe the extent to which similar and different equipments are used for maintenance and supply documents, and consider the impact of having different equipment at user level);
3. Determine the degree of intra- and inter-Service/Agency coordination effected and required in such processes;
4. Survey industry developments and applications in this area;
5. Seek means for attaining more consistency in systems (i.e., less proliferation of methods);
6. Evaluate the relative cost and effectiveness of the various methods; and
7. Recommend system modifications when analysis indicates a net system improvement.



#### D. SCOPE

For the purpose of this survey, "Technical Manuals" are publications containing instructions designed to meet the needs of personnel engaged or being trained in the operation, maintenance, service, overhaul, installation, test, and inspection of specified items of equipment or materiel. The contents of such manuals, some color coded, may be manuscript, diagrams, tables, charts, or drawings used for the purpose stated.

The scope of the study will encompass the means for storing, retrieving, producing/publishing, distributing, updating, and using technical manuals and their contents.

The study specifically excludes evaluation of (1) the means for developing technical data and (2) the data content of technical manuals.

#### E. TEAM COMPOSITION AND ADMINISTRATION

The Study Team will be composed of four full-time members of the Defense Logistics Analysis Office (DLAO) including a Team Director, plus, as required, a technical documentation and/or publication and/or micromedia specialist.

The Study Team will receive administrative support from the DLAO and DSA Administrative Support Center in accordance with ongoing arrangements. TDY expenses will be provided by the home office of the individual team members.

#### F. CONTACT POINTS

Each Military Service and DSA will designate an individual to serve as point of contact with the Study Team. This individual will be responsible for providing, or arranging for, required data and briefings and for furnishing assistance in arranging visits, as necessary.

The name, organization, and telephone number of contact points will be furnished to the Defense Logistics Analysis Office within fifteen days of the date of the memorandum approving this Study Plan. Notification to the DLAO may be by telephone at 274-6283 (Autovon 284-6283).

The OSD Project Officer for this assignment is Mr. Robert T. Russell, OASD(I&L) (MD), 695-0037.

## G. APPROACH

The Study will be completed in three phases:

| <u>Phase</u> | <u>Coverage</u>  |
|--------------|--|
| I            | Planning and Indoctrination 6 weeks (18 Oct - 26 Nov)    |
| II           | On-Site Field Research 14 weeks (29 Nov - 4 Mar)         |
| III          | Analysis & Report Preparation 14 weeks ( 7 Mar - 10 Jun) |

A fourth phase of 2 weeks (13-22 June) will include preparation of briefings and presentation of the Report.

1. Planning and Indoctrination. During Phase I of the Study, the Team will: (a) read and review current directives and instructions, previous studies, and industrial brochures related to the Study subjects, (b) exchange information and ideas, (c) receive headquarters--Military Service and DSA-- briefings regarding their respective current and planned methodology for the production, distribution, and use of Technical Manuals, (d) develop a field research itinerary, (e) develop detailed field research questionnaires, and (f) develop specific data requirements.

2. On-Site Field Research. During Phase II, the Team will: (a) perform on-site field research at Military Service and Agency activities and commercial contractors responsible for producing, distributing, and updating technical manuals and at installations using technical manuals in the performance of day-to-day missions, (b) document the methodology used by DoD Components and contractors for providing, distributing, and using technical manuals, (c) determine the equipment available and used for these purposes, (d) collect statistics--volume, resources, and cost--associated with current and projected technical manual processes, and (e) commence analyses of findings.

3. Analysis and Report Preparation. During Phase III, the Team will: (a) assimilate the data accumulated through preliminary and on-site field research and associated data collection systems into a report describing current and potential systems for the production, filing, distribution, maintenance, and use of technical manuals, (b) analyze the relative merits of the various systems and associated equipment, and (c) develop conclusions and recommendations regarding (1) the extent of system standardization desired and attainable, (2) the type of hardware and media most appropriate for use in such systems, and (3) the system specifications.

4. Briefings. Finally, in Phase IV, the Study Team will present the Report in the form of an oral presentation and a printed Report.



## APPENDIX B

### DEFINITIONS

#### Technical Data:

Are recorded information used to define a design and to produce, support, maintain or operate items of defense materiel. These data may be recorded as graphic or pictorial photographs; text in specifications or related performance or design type documents; in machine forms such as punched cards, magnetic tape, computer memory printouts; or may be retained in computer memory. Examples of recorded information include engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information. Source: DoDI 5010.12, Management of Technical Data (I&L).

#### Technical Document:

Any document which contains technical information or data regardless of its physical form or characteristics, including, without limitation, the following:

1. Written or printed material.
2. Data processing cards or tapes.
3. Maps, charts, photographs, negatives, moving or still films, or film strips.
4. Paintings, drawings, engravings, or sketches.
5. Sound, voices, or electronic recordings.
6. Reproduction of the foregoing by any means or process.

Source: DoDD 5200.20, Distribution Statements on Technical Documents (DDR&E).

#### Technical Information:

Information or data, including scientific information, which relates to research, development, engineering, test, evaluation, production, operation, use, or maintenance of munitions and other military supplies and equipment.

Source: DoDD 5200.20, Distribution Statements on Technical Documents (DDR&E).

Technical Publications: Consist of, but are not limited to: technical manuals, bulletins, and orders; engineering drawings; supply and service bulletins; lubrication orders; and repair parts lists.  
Source: School of Systems and Logistics,  
Air University, Compendium of  
Logistics Forms and Definitions.

Technical Manuals:

DoD: Are defined as publications and other forms of documentation containing a description of defense materiel with instructions for effective use. They will normally include operational instructions; maintenance instructions; parts lists or parts breakdown; and related technical information or procedures exclusive of administrative procedures. Other categories of technical publications may be classified as TMs upon determination by using DoD Components.  
Source: DoDI 4151.9, Technical Manual (TM)  
Management ASD(I&L)

Army: Instructions pertaining to the installation, operation, maintenance, and repair parts support of specific item of materiel or groups of related equipment.  
Source: AR 310-2, Identification and Distribution of DA Publications and Issue of Agency and Command Administrative Publications.

Army: A manual providing detailed treatment of specific subjects considered necessary for the full accomplishment of required training. A technical manual also contains descriptions of materiel and instructions for the operation, handling and maintenance and repair thereof; information and instructions on technical procedures exclusive of those of an administrative nature.  
Source: AR 310-25, Dictionary of United States Army Terms.



## Technical Manuals:

### Navy:

Technical manuals are defined as publications and other forms of documentation containing a description of equipment, weapons, or systems, with instructions for effective use, including one or more of the following sections as required: instructions covering initial preparation and installation; operating instructions; maintenance instructions; overhaul instructions; parts listing; and related technical informations or procedures exclusive of those procedures of an administrative or tactical nature.

Source: NAVMATINST 5600.10, Technical Manual Management Policies and Procedures.

### Navy:

Technical manuals are defined as publications and other forms of documentation containing a description of defense materiel with instructions for effective use. They will normally include operational instructions; maintenance instructions; parts lists or parts breakdown; and related technical information or procedures exclusive of administrative procedures. Other categories of technical publications may be classified as TMs upon determination by using DoD Components.

Source: OPNAVINST 4410.1A, Navy Technical Manual (TM) Policies and Responsibilities.

### Navy:

Technical manuals are all types and forms of technical publications procured by Technical Manual Contrast Requirement (TMCR) or equivalent for issue under the cognizance of the Naval Air Systems Command.

Source: NAVAIR 00-25-601, Management Procedures for Out of Production Category of Aircraft/Equipment Manuals.

### Air Force:

Technical manuals are those manuals that cover installation, operation, maintenance and handling of Air Force equipment and material.

Source: TO 00-5-1, Air Force Technical Order System.

Technical Manuals:

Marine Corps:

Technical manuals are defined as publications and other forms of documentation containing a description of defense materiel with instructions for effective use. They will normally include operational instructions; maintenance instructions; parts lists or parts breakdown; and related technical information or procedures exclusive of administrative procedures. Other categories of technical publications may be classified as TMs upon determination by using DoD Components.

Source: MCO 5600.42A, Technical Manual Management.

DLA:

Technical manuals are publications and other forms of documentation containing a description of equipment, weapons, or weapons systems, with instructions for effective use, including one or more of the following sections as required: instructions covering initial preparation for use; operational instructions; maintenance instructions; overhaul instructions; related technical information or procedures exclusive of those procedures of an administrative nature; and parts list of parts breakdown.

Source: DLA Dictionary of Terms.

DLA:

Publications and other forms of documentation containing a description of defense materiel with instructions for effective use. They will normally include operational instructions, maintenance instructions, parts lists, or parts breakdown, and related technical information or procedures exclusive of administrative procedures. Other categories of technical publications may be classified as TMs upon determination by using DoD components.

Source: DLAR 4151.11



# APPENDIX C

## TYPES OF "TECHNICAL MANUALS"

| Publications Category                        | A | AF | N | MC | DLA |
|--|---|----|---|----|-----|
| Technical Manual (TM)                        | x |    | x | x  | x   |
| Technical Order (TO)                         |   | x  |   |    | x   |
| Technical Bulletin (TB)                      | x | x  |   |    |     |
| Technical Instructions                       |   |    |   | x  |     |
| Technical Manual Indices                     |   |    | x |    |     |
| Equipment Manual                             | x |    | x |    |     |
| System Manual                                |   |    | x |    |     |
| Operating Manual                             | x |    |   |    |     |
| Operators Manual                             | x | x  |   |    | x   |
| Operating Instructions                       |   |    |   |    | x   |
| Operating Guides                             |   |    | x |    |     |
| Operator & Organizational Maintenance Manual |   |    | x |    |     |
| Organizational Maintenance Manual            | x | x  |   |    |     |
| Maintenance Standards                        |   |    |   |    | x   |
| Maintenance Manual                           | x |    |   |    | x   |
| Maintenance Instructions                     | x |    |   |    | x   |
| DS & GS & Depot Maintenance Manual           | x |    |   |    | x   |
| Training Guides                              | x |    |   |    |     |
| Training Aid Books                           |   |    | x |    |     |
| Lubrication Orders                           | x |    |   | x  |     |
| Lubrication Instructions                     |   |    |   | x  |     |
| Time Compliance Tech Order (TCTO)            |   | x  |   |    |     |
| Modification Instructions                    |   |    | x | x  |     |
| Job Guide Manuals                            |   | x  |   |    |     |
| Work Unit Code Manual                        |   |    | x |    |     |
| Theory of Operation                          |   | x  |   |    |     |
| Engineering Changes                          |   |    | x |    |     |
| Supply Bulletins (certain)                   | x |    |   |    |     |
| Supply Manuals (certain)                     | x |    |   |    |     |
| Repair Parts List                            | x |    |   | x  | x   |
| Repair Parts & Special Tools List            | x | x  |   |    |     |
| Illustrated Parts Breakdown TM               | x |    | x |    | x   |
| Component List                               | x |    |   | x  |     |
| Overhaul Instructions                        | x |    |   |    | x   |
| Instrument Calibration Procedures            |   |    |   | x  |     |
| Installation Instructions                    | x |    |   |    | x   |
| Firing Tables                                |   |    |   | x  |     |
| Rebuild Standards                            |   |    |   | x  |     |
| Ship Information Book (SIB)                  |   |    | x |    |     |
| Propulsion Operation Guides (POG)            |   |    | x |    |     |
| FBM Weapon Support System Manual             |   |    | x |    |     |
| Damage Control Books                         |   |    | x |    |     |
| Joint Atomic Weapons Publications TOs        |   | x  |   |    |     |
| Methods & Procedures TOs                     |   | x  |   |    |     |
| Check Lists                                  |   | x  | x |    |     |
| Maintenance Requirement Cards (MRC)          |   |    | x |    |     |

(Continued on next page)

| Publications Category (Continued)                 | A | AF | N | MC | DLA |
|---|---|----|---|----|-----|
| Complete Engine Repair Regiments Cards<br>(CERRC) |   |    | x |    |     |
| Checkout Tapes & Cards                            |   | x  | x |    |     |
| Applicability Lists                               |   |    | x |    |     |
| Sequence Control Charts (SCC)                     |   |    | x |    |     |
| Modification Work Orders                          | x |    |   |    |     |
| Allowance Lists                                   |   |    | x | x  |     |

Source: The listing was compiled from references to Service/Agency directives, publications, indexes and/or Headquarters Level Briefings.

NOTE: This listing provides examples of the types of publications/material referred to as Technical Manuals either through official classification or practice by the Services/Agencies. This listing is neither exhaustive nor final.



APPENDIX D

PRELIMINARY LIST

OF

POSSIBLE TECHNICAL MANUAL RELATED  
SPECIFICATIONS/STANDARDS/INSTRUCTIONS

|               |   |
|---------------|---|
| MIL-D-963     | Drawings, Electrical, Hull and Mechanical Equipment for Naval Shipboard Use   |
| MIL-D-1000/A  | Drawing Engineering and Associated List   |
| MIL-D-1000/1A | Drawing Engineering and Associated Data   |
| MIL-D-1000/2A | Drawing Engineering and Associated Lists  |
| MIL-D-1000/3  | Drawing Installation Plans and Preliminary Data for Electronic and Related Equipment  |
| MIL-D-1000/4  | Drawing Engineering and Associated Data   |
| MIL-D-1000/11 | Drawing Installation, Industry Standard   |
| MIL-M-5096D   | Manual, Technical, Inspection and Maintenance Requirements Manuals; Work Cards: Acceptance and Functional Check Flight Procedure Manuals and Checklists: Inspection Sequence Charts |
| MIL-M-5166C   | Manual, Technical, Assembly, Servicing, and Organizational Maintenance  |
| MIL-M-5288F   | Manual, Technical, Cargo Loading and Offloading   |
| MIL-H-5474A   | Handbook and Breakdowns, General Preparation of,  |
| MIL-D-5480E   | Data, Engineering and Technical Reproduction; Requirements for,   |
| MIL-M-5920B   | Manual, Technical, Basic Weight Checklist and Loading Data  |
| MIL-I-5997B   | Instrument and Instrument Panels, Aircraft; Installation of,  |
| MIL-M-6675A   | Manual, Technical Buildup Instructions, Aircraft Power Package  |
| MIL-I-7028    | Instrument and Instrument Boards, Aircraft; Installation of,  |
| MIL-O-7174    | Overhaul, Electronic Equipments, General Specifications for,  |

|                 |  |
|-----------------|--|
| MIL-M-7298C     | Manual, Technical, Commercial Equipment  |
| MIL-N-7384C     | Manual, Technical, Notices: Contractor Furnished Equipment   |
| MIL-M-7700A     | Manuals, Flight  |
| MIL-D-7822      | Drawings for Standard Aircraft Characteristics and Performance Charts, Piloted Aircraft                    |
| MIL-H-7863(Aer) | Handbooks and Breakdown: Title Pages, "A" Pages and Revised Text Pages; General Specification for          |
| MIL-L-7976B     | List and Card, Technical Manual Data for Contractor Furnished Equipment and Accessories                    |
| MIL-L-8031C     | Manual, Technical, List of Applicable Publications   |
| MIL-L-8031D     | List of Applicable Publications (Loops)  |
| MIL-M-8074B     | Manual, Technical, Inspection Requirements (Training Devices)  |
| MIL-D-8510B     | Drawings, Undimensioned, Reproducibles, Photographs and Contact; Preparation of,                           |
| MIL-P-8582(Aer) | Manuals, Aeronautical Technical: Printing and Binding of   |
| MIL-M-8910A     | Preparation of Technical Manuals; Illustrated Parts Breakdown  |
| MIL-C-9851B     | Manual, Technical, Checkout and Servicing Sheet (Nonreparable Equipment)                                   |
| MIL-M-9854B     | Manual, Technical, Structural Repair   |
| MIL-M-9864B     | Manual, Technical, Organizational Maintenance  |
| MIL-M-9868/1    | Microfilming of Engineering Documents, 35mm, Requirements for,   |
| MIL-G-9877      | Cards, Aperture  |
| MIL-P-9879      | Photographing of Construction/Architectural Drawings, Maps and Related Documents, 105mm; Requirements for, |
| MIL-C-9883B     | Manual, Technical, Checklist: Organizational Maintenance (Ballistic Missiles)                              |



|                   |  |
|-------------------|--|
| MIL-M-9891A       | Manual, Technical, Field Maintenance and Depot Overhaul (Missile Components)                                   |
| MIL-M-9901A       | Manuals, Technical: Tapes: and Cards   |
| MIL-M-9910A       | Manual, Technical, Operation and Maintenance with Parts Breakdown (Quick Reaction Capability Equipment)        |
| MIL-M-9913A       | Manual, Technical, Inspection, Repair, Packing (Parachutes)  |
| MIL-C-9927A       | Manual, Technical, Checklist: Organizational Maintenance   |
| MIL-C-9949        | Cards, Copy  |
| MIL-M-9977E       | Manual, Technical, Loading: Nuclear and Non-nuclear Munitions (Tactical Aircraft)                              |
| MIL-M-9994B       | Manual, Technical, Operation and Maintenance (Mobile Training Sets and Part Task Trainers)                     |
| MIL-M-15071(G)(H) | Manual, Technical, Equipment and Systems Content, Requirements for,  |
| MIL-S-15822B      | Sheet, Technical Supply Data and Instruction   |
| MIL-P-16790B      | Publication, Planned Maintenance System for Training Devices   |
| MIL-L-17192C      | Lubrication Design, Lubricants and Lubrication Information for Electronic Equipment: General Specification for |
| MIL-C-17581       | Chart, Operating Instructions for Ship or Shore Electronic Equipment   |
| MIL-F-17655C      | Field Changes and Field Change Kits, General Specifications for,   |
| MIL-N-17792B      | Negative, For Reproduction, General Preparation for,   |
| MIL-I-18373A      | Instrument and Navigation Equipment, Aircraft, Installation of,  |
| MIL-M-19562A      | Maintenance Prints for Electronic Equipment, Instructions for Preparation of,                                  |
| MIL-H-19652(Aer)  | Handbook: Operation, Service, and Repair Instructions with Parts Breakdown (Automatic Ground Equipment Items)  |

|                |  |
|----------------|--|
| MIL-D-19890A   | Descriptive Plan for Item Identification   |
| MIL-M-20800    | Manual, Technical, Nuclear Weapons   |
| MIL-M-20800B   | Manual, Technical: Atomic Weapons (Nuclear)  |
| MIL-M-21548(b) | Manual, Technical, FBM Weapons System, General Specification for,  |
| MIL-S-21740    | Sheet, Technical Data Performance Standards  |
| MIL-B-21741C   | Book, Technical Maintenance Standards  |
| MIL-M-21742A   | Content Requirements for Technical Manuals; Overhaul of Electronic and IC Equipment                                    |
| MIL-M-21861    | Manual, Technical, Materiels Handling Equipment Preparation, Contents and Approval                                     |
| MIL-M-22202B   | Manual, Technical, Cross Servicing Schedule (Aircraft), Preparation of,  |
| MIL-P-22203    | Performance Data Report for Standard Aircraft Characteristics Charts for Piloted Aircraft                              |
| MIL-B-22907    | Bulletins, Service Catapult, Arresting Gear and Catapult Deck Gear and Accessories, Preparation of,                    |
| MIL-C-22908    | Changes, Service, Catapult Arresting Gear, Visual Landing Aids and Catapult Deck Gear and Accessories, Preparation of, |
| MIL-D-23140A   | Drawing Preliminary and Final, Electronic Equipment and Systems, Installation Control                                  |
| MIL-M-23305    | Technical Manuals; Maintenance, Overhaul, and IPB for Aircraft Launching and Recovery Equipment                        |
| MIL-T-23382    | Technical Manual, Safety Requirements for Weapons Systems  |
| MIL-T-23383    | Technical Manual, Safety Requirements Supplement to Existing Weapon Systems Manual                                     |
| MIL-T-23384    | Technical Manual, Safety Requirements for Missile Complete Round   |
| MIL-T-23385    | Technical Manual, Safety Requirements Supplement to Existing Manuals for Missile Complete Round                        |



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|------------------|--|
| MIL-T-23386      | Technical Manual, Safety Requirements Supplement to Existing Manuals for Missile Components  |
| MIL-M-23618      | Manual, Technical: Periodic Maintenance Requirements; Preparation of,  |
| MIL-M-23619A     | Manual, Technical, Periodic Maintenance Requirements, Maintenance Requirements Cards, Sequence Control Charts, And Related Test Flight Check List, For Air Weapons Systems, Printing and Binding of, |
| MIL-D-23660A     | Data, Technical for Rocket Motors  |
| MIL-M-23695(Wep) | Manuals, Technical: Test Equipment, Calibration Procedures; Preparation of   |
| MIL-M-23782B     | Manual, Technical, Aircraft Work Unit Code Manuals, Preparation of,  |
| MIL-M-24100B     | Manual, Technical (Required for equipment beyond scope covered by MIL-M-7298)  |
| MIL-D-24241      | Drawing, Sonar Systems, Preliminary Installation Planning  |
| MIL-T-24255A     | Technical Repair Standards (For Submarines Only)   |
| MIL-O-24312A     | Operations Station Book (OsB)  |
| MIL-R-24358      | Restoration, Shipboard Electronic Equipment F, 1N and 2N Cognizance  |
| MIL-M-24365A     | Maintenance Engineering Analysis Procedures and Document Requirements  |
| MIL-T-24424      | Technical/maintenance Overhaul and Repair Standards  |
| MIL-P-24534      | Planned Maintenance Subsystem, Development of Maintenance Requirement Cards, Maintenance Index Pages and Associated Documentation  |
| MIL-M-25095A     | Manual, Technical, Intermediate Maintenance (Avionics)   |
| MIL-M-25393A     | Manual, Technical, Intermediate Maintenance (Airborne Mechanical Equipment)  |
| MIL-M-25394A     | Manual, Technical, Overhaul Instructions and Intermediate Maintenance Instructions (Engines)   |
| MIL-T-25802F     | Technical Manual, Loading and Transport of Nuclear Weapon Cargo in Cargo Aircraft, Preparation of,   |

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|-----------------|---|
| MIL-M-25832G    | Manual, Technical, Delivery, Air to Air,<br>Nuclear Weapons   |
| MIL-T-25832G    | Technical Manual, Aircrew, Nuclear Weapon<br>Delivery, Air-to-air, Preparation of,  |
| MIL-T-25848A    | Manual, Technical, Delivery, Air to Ground,<br>Special Weapons (Strategic Bomber Aircraft)                                  |
| MIL-T-25848B    | Technical Manual, Aircrew, Special Weapon,<br>Air to Ground Missile Delivery, Strategic<br>Bomber Aircraft, Preparation of, |
| MIL-M-26788C    | Manual, Technical, Operation and Maintenance<br>Instructions (Vehicles), Preparation of,                                    |
| MIL-T-27018E    | Manual, Technical, Loading, Special Weapons<br>(Fighter Interceptor Aircraft)   |
| MIL-M-27026E    | Manual, Technical, Delivery, Level, Nuclear<br>Weapons (Strategic Bomber Aircraft)  |
| MIL-C-27278B    | Manual, Technical, Checklists: Flight Crew  |
| MIL-M-27579D    | Manual, Technical, Delivery, Multimode Nuclear<br>Weapons (Tactical Aircraft)   |
| MIL-T-27579D(1) | Technical Manual, Aircrew, Nuclear Weapon<br>(Bomb) Delivery, Multimode, Preparation of,                                    |
| MIL-M-27586C    | Manual, Technical, Loading, Nuclear Munitions<br>(Strategic Bomber Aircraft)  |
| MIL-T-27594A    | Manual, Technical, Assembly, Test and Storage<br>(Missile/Warhead)  |
| MIL-T-27594A(2) | Technical Manual and Checklist Assembly, Test<br>and Storage Procedures, Missile/warhead Mating,<br>Preparation of,         |
| MIL-M-28651     | Manual, Technical, Real Property Facilities   |
| MIL-P-28759     | Preparation and Contents of MRC's and MIP's   |
| MIL-M-28947A    | Illustrations for Technical Repair Parts<br>Publications, Preparation of,   |
| MIL-P-28999     | Publications Technical, Instruction Type,<br>Preparation of,  |



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|--------------|--|
| MIL-G-29011  | Guide, Operation and Maintenance for Training Aids, for Preparation of,  |
| MIL-M-29355  | Manual, Technical, Operation and Maintenance Instructions for Operators of Various Types of Equipment, Preparation of,   |
| MIL-M-38311A | Manual, Technical, Operation Instruction and Checklist   |
| MIL-M-38312A | Manual, Technical, Real Property Installed Equipment (Equipment)   |
| MIL-M-38313A | Manual, Technical, Real Property Installed Equipment (System)  |
| MIL-M-38384A | Manual, Technical, Delivery, Nonnuclear Weapons  |
| MIL-M-38413A | Manual, Technical, Air Refueling Procedures  |
| MIL-M-38701  | Manual, Technical, Inspection Requirements: Manuals and Work Cards   |
| MIL-M-38716A | Manual, Technical, Loading: Nonnuclear Munitions (Strategic Aircraft)  |
| MIL-M-38717A | Manual, Technical, Work Unit Code Manuals  |
| MIL-M-38717B | Manual, Technical, Work Unit Code (Ground Communications Electronics Meteorological Equipment)   |
| MIL-C-38720A | Manual, Technical, Checklist Intermediate Maintenance (Bench Check)(Airborne Armament and Electronic Equipment)  |
| MIL-M-38733B | Manual, Technical, Operation Instructions (Hand Held Flight Computers)   |
| MIL-M-38748B | Microfiche: For Engineering/Technical Data, Reports, Studies and Related Data, Requirements for,   |
| MIL-M-38761  | Microfilming and Photographing of Engineering/ Technical Data and Related Documents: PCAM Card Preparation, Engineering Data Micro-Reproduction System, General Requirements for Preparation of, |

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|---------------|--|
| MIL-M-38761/1 | Microfilm and Tabulating Cards used for Recording Engineering Drawings and Associated Data                           |
| MIL-M-38761/2 | Microfilm Aperture Cards for Navy Ship Systems   |
| MIL-M-38761/3 | Microfilm Engineering Drawings and Associated Data   |
| MIL-M-38768A  | Manual, Technical, Work Unit Code Manuals (Surface Launched Missiles)  |
| MIL-M-38769B  | Manual, Technical, Work Unit Code Manuals (Aircraft and Drones)  |
| MIL-M-38777A  | Manual, Technical, Inspection and Lubrication Requirements: Manuals and Work Cards                                   |
| MIL-C-38778A  | Manual, Technical, Checklists: Title Page, List of Effective Pages, Printing and Binders                             |
| MIL-M-38780   | Manual, Technical, Nondestructive Inspection   |
| MIL-M-38781C  | Manual, Technical, Storage and Maintenance Procedures (Nonnuclear Munitions)   |
| MIL-C-38782   | Manual, Technical, Checklists: Operational Readiness and Serviceable Condition; Preparation of,                      |
| MIL-M-38783A  | Manual, Technical, Work Unit Code Manuals (Air Launched Missiles)  |
| MIL-M-38784A  | Manuals, Technical: General Style and Format Requirements  |
| MIL-M-38786A  | Manual, Technical, Work Unit Code Manuals (Training Equipment)   |
| MIL-M-38787   | Manual, Technical, Missile Motors  |
| MIL-M-38788A  | Manual, Technical, Work Unit Code Manuals (Aerospace Ground Equipment)   |
| MIL-M-38789A  | Manual, Technical, Overhaul Instructions, and Overhaul Instructions with Parts Breakdown (Equipment and Accessories) |



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|-----------------|---|
| MIL-P-38790     | Printing Production of Technical Manuals,<br>General Requirements for,  |
| MIL-M-38791     | Manual, Technical, Engineering Installation<br>Facility Standards   |
| MIL-M-38792A    | Manual, Technical, Nonnuclear Explosive Ordnance<br>Disposal Procedures (Aircraft Weapon Systems)   |
| MIL-M-38793     | Manual, Technical, Calibration Procedures,<br>Preparation of,   |
| MIL-M-38793(1A) | Manual, Technical, Calibration Procedures,<br>Submission of,  |
| MIL-S-38794     | Manual, Technical, Source Data, Nonnuclear<br>Munitions   |
| MIL-M-38795     | Manual, Technical, Corrosion Control  |
| MIL-M-38796     | Manual, Technical, Organizational, Intermediate,<br>and Depot Maintenance Instructions (Shipping<br>and Storage Containers, Nonnuclear Munitions) |
| MIL-M-38797     | Manual, Technical, Operation and Maintenance<br>Instructions (Various Types of Equipment)   |
| MIL-M-38798A    | Manual, Technical, Operation Instructions,<br>Maintenance Instructions, Circuit Diagrams,<br>Alignment Procedures, and Installation Planning      |
| MIL-M-38799     | Manual, Technical, Schematic Block Diagrams (SBD)<br>and Maintenance Dependency Charts (MDC)  |
| MIL-M-38800A    | Manual, Technical, Organizational Maintenance   |
| MIL-M-38801     | Manual, Technical, Aircraft Emergency Rescue<br>Information (Fire Protection)   |
| MIL-M-38802A    | Microfilming 16mm, Reproduction of TO's   |
| MIL-T-38804     | Manual, Technical, Time Compliance Technical<br>Orders (TCTOS), Preparation of,   |
| MIL-M-38805     | Manual, Technical, Work Unit Code Manuals<br>Nuclear and Nonnuclear Weapons   |

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|-----------------|---|
| MIL-M-38807     | Manual, Technical, Illustrated Parts Breakdown  |
| MIL-M-38811     | Manual, Technical, M.P.T.O.   |
| MIL-M-38812     | Manual, Technical, Maintenance/Overhaul<br>(Automotive Equipment)   |
| MIL-M-38813     | Manual, Technical, Storage Manuals  |
| MIL-M-46849     | Microfilming of Engineering and Related<br>Documents, 16mm, Requirements for,   |
| MIL-D-55176C    | Data, Electronics Command Engineering Document<br>Control   |
| MIL-T-60530A    | Technical Data Package for AMC Material   |
| MIL-M-63000C    | Technical Manuals; General Requirements for<br>Manuscripts  |
| MIL-M-63001E    | Manual, Technical, Repair Parts and Special<br>Tools List   |
| MIL-M-63002C    | Manual, Technical, Requirements for Modification<br>Work Orders   |
| MIL-M-63004B(1) | Manual, Technical, Preparation Instructions<br>for Lubrication Orders   |
| MIL-M-63006B    | Manual, Technical, Equipment Service Ability<br>Criteria  |
| MIL-M-63009C(1) | Manual, Technical, Manuscript Requirements for<br>Mechanical and Construction Equipment, Automotive<br>Equipment, and Power Tools (Excludes Combat<br>Vehicles) |
| MIL-M-63010(1)  | Manual, Technical, DoD Standard Generator Sets  |
| MIL-M-63011     | Manual, Technical, for Maintenance Test Flight<br>of Army Aircraft  |
| MIL-M-63012     | Military Specification: Depot Maintenance Work<br>Requirements for Maintenance/Demilitarization of<br>Conventional and Chemical Ammunitions                     |



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|----------------|---|
| MIL-M-63013A   | Catalogs, Supply Sets, Kits, and Outfits<br>Components Lists                            |
| MIL-M-63015    | Manuals, Technical: Conventional and Chemical<br>Ammunition                             |
| MIL-M-63016    | Manuals, Technical: Munitions Equipment   |
| MIL-M-60317    | Manuals, Technical: Requirements for Munitions<br>Equipment and Ammunition Data         |
| MIL-M-63018    | Manuals, Technical: Nonnuclear Explosive Ordnance<br>Disposal                           |
| MIL-M-63019    | Manuals, Technical: Telecommunications Equipment<br>(Except Teletypewriter)             |
| MIL-M-63020    | Manuals, Technical: Radar Equipment   |
| MIL-M-63021    | Manuals, Technical Requirements for Teletypewriter<br>Equipment                         |
| MIL-M-63022(1) | Manual, Technical, for Electronic Configurations<br>(Aircraft)                          |
| MIL-M-63023    | Manual, Technical, Transportability Guidance for<br>Military Materiel, Preparation of,  |
| MIL-M-63024    | Manuals, Technical, Photographic, Motion Picture,<br>Sound, and Recording Equipment     |
| MIL-M-63024(2) | Manual, Technical, Photographic, Motion Picture,<br>Sound, and Recording Equipment      |
| MIL-M-63025    | Manuals, Technical: Electronic Test Equipment   |
| MIL-M-63026A   | Manual, Technical, for Army Aircraft  |
| MIL-M-63027    | Manual, Technical, Maintenance and Overhaul<br>Instructions (Aeronautical)              |
| MIL-M-63028    | Manual, Technical, Manuscript Requirements<br>for Maintenance of Aircraft Engines, etc. |
| MIL-M-63029A   | Manual, Technical, Manuscript Requirements for<br>Operator and Crewmember Checklist     |

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|-----------------|---|
| MIL-M-63030B    | Manual, Technical (Referenced to general style and format requirements with MIL-M-38784A)   |
| MIL-M-63032A(1) | Manual, Technical, Manuscript Requirements for Weapons, Combat Vehicles and Fire Control Materiel                                   |
| MIL-M-63033     | Manual, Technical, Requirements for Demilitarization of Surplus Military Items  |
| MIL-M-63036     | Preparation of Operators Technical Manuals  |
| MIL-M-63038-1   | Manual, Technical, Operators  |
| MIL-M-63038-2   | Manual, Technical, Organizational DS/GS   |
| MIL-M-63038-10  | Simplified Operators Manual   |
| MIL-M-63038-20  | Simplified Organizational DS/GS Manuals   |
| MIL-M-63041A(1) | Manual, Technical, Content Requirements for Depot Maintenance Work Requirements   |
| MIL-M-63042B    | Manual, Technical, Procedures for Destruction of Equipment to Prevent Enemy Use   |
| MIL-M-63043     | Manual, Technical, Missile System Equipment Check Procedures  |
| MIL-M-63044     | Manuals, Technical: Missile System Equipment Unit Under Test (UUT), Procedures  |
| MIL-M-63046     | Manuals, Technical: Missile System Equipment  |
| MIL-M-63047     | Manual, Technical, Pocket Size Manuals Operators, Preparation of,   |
| MIL-P-63048A(1) | Preparation of Equipment Publications on Microfiche   |
| MIL-M-63049     | Manual, Technical, List of Applicable Publications  |
| MIL-M-63050     | Manuals, Technical: Component of End Item, Basic Issue Items, Additional Authorizations and Expendable Supplies and Materials Lists |



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|----------------|---|
| MIL-F-80242    | Film Microfiche 48X   |
| MIL-L-81043    | Lubrication Charts for Air Weapons Systems, Preparation of,                             |
| MIL-M-81203A   | Manual, Technical, In Process Reviews and Verification, Support of,                     |
| MIL-M-81218    | Manual, Technical, Aircraft Engine, Intermediate and Depot Maintenance, Preparation of, |
| MIL-C-81222C   | Check Lists, Flight Crew, Preparation of,   |
| MIL-M-81260A   | Technical Manuals; Aircraft/System/Equipment Maintenance                                |
| MIL-M-81273A   | Manual, Technical, General Specification for  |
| MIL-M-81273/1A | Manual, Technical, Users (Equipment Type)   |
| MIL-M-81273/2A | Manual, Technical, Encyclopedia (Reference Type)  |
| MIL-M-81273/3A | Manual, Technical, Encyclopedia (Reference Type)  |
| MIL-M-81273/4A | Manual, Technical, Weapons Systems  |
| MIL-M-81273/5A | Manual, Maintenance Tech, (Equipment Type), Specification for                           |
| MIL-M-81273/6A | Manual, Technical, Electronic Equipment, Guide to Use of,                               |
| MIL-M-81273/7A | Manual, Technical, General Purpose (Reference Type)                                     |
| MIL-M-81273/9  | Manual, Technical, Users (Equipment Type)   |
| MIL-M-81310B   | Manual, Technical, Airborne Weapons/stores Loading (Conventional and Nuclear)           |
| MIL-D-81538B   | Drawing, Engineering and Associated List for Ground Support Equipment                   |
| MIL-M-81700    | Technical Manuals; Airborne Armament Equipment  |
| MIL-M-81701B   | Technical Manuals; Airborne Missiles and Guided Weapons (Microform Compatible)          |
| MIL-M-81702A   | Technical Manuals; General Airborne Weapons (Conventional)                              |
| MIL-M-81715    | Manual, Technical, Ship Weapons Installations   |

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|-----------------|---|
| MIL-M-81748     | Manual, Technical, Rapid Action Changes, Requirements for Preparation of                                |
| MIL-M-81754     | Manual, Technical, Aircraft/Missile TM List, Preparation of,  |
| MIL-M-81792     | Manual, Technical, Loading and Transport of Nuclear Weapons in Cargo Aircraft, Preparation of,          |
| MIL-M-81798     | Manual, Technical, Engine Repair Requirements Cards and Charts, Preparation of                          |
| MIL-C-81810     | Checklist, Airborne Missile and Guided Weapon Assembly  |
| MIL-M-81834     | Manual, Aircraft Tactical, Requirements for Preparation of  |
| MIL-M-81901     | Manual, Technical, Aircraft Fire Fighting, Requirements for Preparation of Information for Inclusion in |
| MIL-M-81919     | Manual, Technical, Support Equipment (Microform Compatible), Preparation of                             |
| MIL-M-81926     | Microfilm Data Retrieval  |
| MIL-M-81927     | General Preparation of Technical Manuals (Microform Compatible)   |
| MIL-M-81928     | Technical Manuals; Aircraft Equipment and Component Maintenance (Microform Compatible)                  |
| MIL-M-81929     | Technical Manuals; IBP's (Microform Compatible)   |
| MIL-M-81930     | TM, 16mm Microfilm  |
| MIL-M-81931     | TM, 16mm Duplicate Microfilm  |
| MIL-M-81932(AS) | Manuals, Technical; 16mm Silver Intermediate Microfilm; Requirements for                                |
| MIL-P-82148     | Printed Wiring Assembly Illustrations and Maintenance Data, Requirements for and Preparation of         |
| MIL-M-82376     | Manual, Technical, Operation and Maintenance Instructions (Training Devices)                            |
| MIL-M-82527A    | Development and Preparation of MRC's and MIP's  |
| MIL-M-82588A    | Manual, Technical, Fire Control Switchboard, Requirements for Preparation of                            |



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| MIL-M-83127A    | Manual, Technical, Sensor Exploitation  |
| MIL-J-83302(AF) | Job Performance Aids, Advanced Type, for VNAF Organizational Maintenance                                  |
| MIL-M-83496     | Manual, Technical, Organizational Maintenance Instructions, Condensed Maintenance Guide (AVIONICS System) |
| MIL-M-83498     | Manual, Technical, Testing Aircraft Power Package (Quick Engine Charge Configuration)                     |
| MIL-M-83499     | Manual, Technical Title Pages, Fit. Manuals, Safety and Op. Supplements                                   |
| MIL-T-83696     | Technical Data, Explosives Hazard Classification, Development of,   |
| MIL-E-83931     | Manual, Technical, Binders, Flexible  |
| MIL-M-85025     | Manuals, Nataps Flight  |
| MIL-T-00547D    | Technical Manuals, General Preparation of   |
| MIL-X-FMTD-156  | Handbooks; Maintenance Instructions (Airborne Weapons Systems)  |
| MIL-X-FMTD-157  | Check List: Operator's Semiautomatic Weapon System Electronic Test Equipment                              |
| MIL-X-FMTD-158  | Tapes: 8-Level, 2-Channel, Binary Coded, Semiautomatic Weapon System Test; Preparation of                 |
| MIL-STD-3       | Electrical Wiring Symbols for Architectural Layout Drawings   |
| MIL-STD-12C     | Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents                   |
| MIL-STD-15-1    | Graphic Symbols for Electrical and Electronic Diagrams  |
| MIL-STD-15-2    | Electrical Equipment Symbols for Ship's Plans   |
| MIL-STD-15-3    | Electrical Wiring Symbols for Architectural and Electrical Layout Drawings                                |
| MIL-STD-17-1    | Mechanical Symbols  |
| MIL-STD-17-2    | Mechanical Symbols for Aeronautical, etc. Use   |

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| MIL-STD-33     | Lubrication Instructions, Preparation and Presentation of                        |
| MIL-STD-34     | Preparation of Drawings for Optical Elements and Systems, General Requirements   |
| MIL-STD-35C    | Automated Engineering Document Preparation System                                |
| MIL-STD-35/3C  | Automated Engineering Document Preparation System, Resistors                     |
| MIL-STD-35/4B  | Automated Engineering Document Preparation System, Capacitors                    |
| MIL-STD-35/5C  | Automated Engineering Document Preparation System, Washers                       |
| MIL-STD-35/6A  | Automated Engineering Document Preparation System, Switches                      |
| MIL-STD-35/7B  | Automated Engineering Document Preparation System, Transformers                  |
| MIL-STD-35/8A  | Automated Engineering Document Preparation System, Relays                        |
| MIL-STD-35/9B  | Automated Engineering Document Preparation System, Terminal Boards               |
| MIL-STD-35/10B | Automated Engineering Document Preparation System, Fuses                         |
| MIL-STD-35/11B | Automated Engineering Document Preparation System, Fuseholders                   |
| MIL-STD-35/12  | Automated Engineering Document Preparation System, Meters                        |
| MIL-STD-35/13  | Automated Engineering Document Preparation System, Solenoids                     |
| MIL-STD-35/14  | Automated Engineering Document Preparation System, Synchros                      |
| MIL-STD-35/15  | Automated Engineering Document Preparation System, Microcircuit Devices, Linear  |
| MIL-STD-35/16A | Automated Engineering Document Preparation System, Microcircuit Devices, Digital |
| MIL-STD-35/17  | Automated Engineering Document Preparation System, Screws                        |



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| MIL-STD-35/18 | Automated Engineering Document Preparation System,<br>Pipe and Tubing, Rigis       |
| MIL-STD-35/19 | Automated Engineering Document Preparation System,<br>Terminal Lugs and Strips     |
| MIL-STD-35/20 | Automated Engineering Document Preparation System,<br>Fittings and Couplings       |
| MIL-STD-35/21 | Automated Engineering Document Preparation System,<br>Hose and Tubing, Flexible    |
| MIL-STD-35/22 | Automated Engineering Document Preparation System-<br>Nuts                         |
| MIL-STD-35/23 | Automated Engineering Document Preparation System,<br>Fasteners                    |
| MIL-STD-35/24 | Automated Engineering Document Preparation System,<br>Bearings                     |
| MIL-STD-35/25 | Automated Engineering Document Preparation System,<br>filter                       |
| MIL-STD-35/26 | Automated Engineering Document Preparation System,<br>Gaskets and Gasket Materials |
| MIL-STD-35/27 | Automated Engineering Document Preparation System,<br>Springs                      |
| MIL-STD-35/28 | Automated Engineering Document Preparation System-<br>coils                        |
| MIL-STD-35/29 | Automated Engineering Document Preparation System,<br>Keys                         |
| MIL-STD-35/30 | Automated Engineering Document Preparation System,<br>Circuit Breakers             |
| MIL-STD-35/31 | Automated Engineering Document Preparation System,<br>Bolts and Studs              |
| MIL-STD-35/32 | Automated Engineering Document Preparation System,<br>Pins                         |
| MIL-STD-35/33 | Automated Engineering Document Preparation System,<br>Packing and Packing Material |
| MIL-STD-35/34 | Automated Engineering Document Preparation System,<br>Inserts                      |

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| MIL-STD-35/35 | Automated Engineering Document Preparation System,<br>Networks                 |
| MIL-STD-35/36 | Automated Engineering Document Preparation System,<br>Seals and Seal Materials |
| MIL-STD-35/37 | Automated Engineering Document Preparation System,<br>Inductors                |
| MIL-STD-35/38 | Automated Engineering Document Preparation System,<br>Crystal Units, Quartz    |
| MIL-STD-35/39 | Automated Engineering Document Preparation System-<br>batteries                |
| MIL-STD-35/40 | Automated Engineering Document Preparation System,<br>Retaining Rings          |
| MIL-STD-35/41 | Automated Engineering Document Preparation System,<br>Filters, Mechanical      |
| MIL-STD-35/42 | Automated Engineering Document Preparation System,<br>Waveguides               |
| MIL-STD-35/43 | Automated Engineering Document Preparation System,<br>Antennas                 |
| MIL-STD-35/44 | Automated Engineering Document Preparation System                              |
| MIL-STD-35/45 | Automated Engineering Document Preparation System,<br>Resolvers, Electrical    |
| MIL-STD-35/46 | Automated Engineering Document Preparation System,<br>Valves (Powered)         |
| MIL-STD-35/48 | Automated Engineering Document Preparation System,<br>Transducers              |
| MIL-STD-35/49 | Automated Engineering Document Preparation System-<br>gears                    |
| MIL-STD-35/50 | Automated Engineering Document Preparation System,<br>Pulleys                  |
| MIL-STD-35/51 | Automated Engineering Document Preparation System,<br>Sprockets                |
| MIL-STD-35/52 | Automated Engineering Document Preparation System-<br>lamps                    |



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| MIL-STD-35/53 | Automated Engineering Document Preparation System, Adapters, Electrical  |
| MIL-STD-35/54 | Automated Engineering Document Preparation System Semiconductor Devices, Tunnel Diodes                         |
| MIL-STD-35/55 | Automated Engineering Document Preparation System, Semiconductor Devices, Microwave Diodes                     |
| MIL-STD-35/56 | Automated Engineering Document Preparation System Semiconductor Devices, Voltage Variable Capacitor Diodes     |
| MIL-STD-35/57 | Automated Engineering Document Preparation System Semiconductor Devices, Regulator Diodes                      |
| MIL-STD-35/58 | Automated Engineering Document Preparation System Semiconductor Devices, Thyristor Diodes                      |
| MIL-STD-35/59 | Automated Engineering Document Preparation System Semiconductor Devices, Field Effect Transistors              |
| MIL-STD-35/60 | Automated Engineering Document Preparation System Semiconductor Devices, Optoelectronic Transistors            |
| MIL-STD-35/61 | Automated Engineering Document Preparation System Semiconductor Devices, Bipolar Transistors                   |
| MIL-STD-35/62 | Automated Engineering Document Preparation System Semiconductor Devices, Unijunction Transistors               |
| MIL-STD-35/63 | Automated Engineering Document Preparation System Semiconductor Devices, Chopper Transistors                   |
| MIL-STD-35/64 | Automated Engineering Document Preparation System, Semiconductor Devices, Rectifier Diodes                     |
| MIL-STD-35/65 | Automated Engineering Document Preparation System-electrical Connectors, Circular                              |
| MIL-STD-35/66 | Automated Engineering Document Preparation System Electrical Connectors, Printed Wiring Board, Coax, and Power |

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| MIL-STD-35/67 | Automated Engineering Document Preparation System Electrical Cables, Cord and Wire   |
| MIL-STD-35/68 | Automated Engineering Document Preparation System-electrical Cables, Coax and Special Purpose                              |
| MIL-STD-35/69 | Automated Engineering Document Preparation System Electrical Connectors, Rec Angular                                       |
| MIL-STD-35/70 | Automated Engineering Document Preparation System, Switches (Toggle)   |
| MIL-STD-35/71 | Automated Engineering Document Preparation System, Switches (Thermal)  |
| MIL-STD-35/72 | Automated Engineering Document Preparation System, actuators, Electromechanical, Rotary                                    |
| MIL-STD-35/73 | Automated Engineering Document Preparation System, Actuators, Electromechanical, Linear                                    |
| MIL-STD-35/74 | Automated Engineering Document Preparation System, Actuators, Explosive  |
| MIL-STD-35/75 | Automated Engineering Document Preparation System Microwave/waveguide Components   |
| MIL-STD-35/76 | Automated Engineering Document Preparation System, Thermistors   |
| MIL-STD-35/77 | Automated Engineering Document Preparation System, Vehicles, Commercial, Automobiles, Buses, Ambulances and Station Wagons |
| MIL-STD-35/78 | Automated Engineering Document Preparation System, Adhesives   |
| MIL-STD-35/79 | Automated Engineering Document Preparation System, Attenuators, Fixed and Variable   |
| MIL-STD-35/80 | Automated Engineering Document Preparation System, Belts, Transmission and Conveyor  |
| MIL-STD-35/81 | Automated Engineering Document Preparation System, Containers  |



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| MIL-STD-35/82  | Automated Engineering Document Preparation System-Converters and Inverters   |
| MIL-STD-35/83  | Automated Engineering Document Preparation System, Motor-generator Sets and Dynamotors                                 |
| MIL-STD-35/84  | Automated Engineering Document Preparation System-dummy Loads  |
| MIL-STD-35/85  | Automated Engineering Document Preparation System-Fans and Impellers   |
| MIL-STD-35/86  | Automated Engineering Document Preparation System-nuts   |
| MIL-STD-35/87  | Automated Engineering Document Preparation System, Holders, Supports, And Brackets (Crystal)                           |
| MIL-STD-35/88  | Automated Engineering Document Preparation System, Knobs, Dials, And Pointers  |
| MIL-STD-35/89  | Automated Engineering Document Preparation System, Motors, AC and DC   |
| MIL-STD-35/91  | Automated Engineering Document Preparation System, Connector Accessories   |
| MIL-STD-35/93  | Automated Engineering Document Preparation System, Gages, Hydraulic, Pneumatic, and Vacuum                             |
| MIL-STD-35/95  | Automated Engineering Document Preparation System-Pumps-hydraulic, Pneumatic, and Vacuum                               |
| MIL-STD-35/96  | Automated Engineering Document Preparation System, Regulators, Current And Voltage, AC and DC                          |
| MIL-STD-35/98  | Automated Engineering Document Preparation System, Capacitors, Variable  |
| MIL-STD-35/100 | Automated Engineering Document Preparation System, Regulators and Nonpowered Valves (Hydraulic, Pneumatic, and Vacuum) |
| MIL-STD-35/101 | Automated Engineering Document Preparation System, Relays, Solid State   |

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| MIL-STD-35/102 | Automated Engineering Document Preparation System-printed Wiring, Flexible   |
| MIL-STD-35/104 | Automated Engineering Document Preparation System, Universal Joints  |
| MIL-STD-35/105 | Automated Engineering Document Preparation System, Thermocouples   |
| MIL-STD-35/106 | Automated Engineering Document Preparation System, Counters, Reciprocating and Rotating                                      |
| MIL-STD-100    | Engineering Drawing Practices  |
| MIL-STD-399    | Microform Format   |
| MIL-STD-768    | Instructions for Repair of Aircraft and Weapons Sandwich Structures, Part 1, Metal Construction                              |
| MIL-STD-768A   | Instruction for Repair of Aircraft and Weapons Reinforced Plastic and Sandwich Structures, Part 1, All Plastic Constructions |
| MIL-STD-771C   | Damage Control Books for Auxilliary and Miscellaneous Small Ships  |
| MIL-STD-772C   | Damage Control Books for Warships (etc.), Preparation of   |
| MIL-STD-797D   | Damage Control Books for Submarines, Preparation and Revision of   |
| MIL-STD-804    | Formats and Coding Aperture, Copy and Tabulating Cards for EDMS  |
| MIL-STD-806C   | Graphical Symbols for Logic Diagrams   |
| MIL-STD-1009   | Standard Method of Referring to Chapters, Pages, Articles, etc. of Documents and Publications                                |
| MIL-STD-1227B  | Engine Gasoline, Air Cooled 3Bhp, Military Design Model 2A016, Installation Procedures                                       |



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| MIL-STD-1300A  | Engine Gasoline, Air Cooled 6 Bhp, Military Design Model 4A032, Installation Procedures      |
| MIL-STD-1345A  | Data, Measurement, in Support of Maintenance, Calibration and Repair of Electronic Equipment |
| MIL-STD-1381   | Technical Electronic Terms and Definitions   |
| MIL-STD-1401   | Engine Gasoline, Air Cooled Military Design Model 4A084, Installation Procedures             |
| MIL-STD-1402   | Engine Gasoline, Air Cooled Military Design, Model 4A084, Installation Procedures            |
| MIL-STD-1604   | Technical and Maintenance Overhaul and Repair Standards, Preparation of                      |
| MIL-STD-7843   | Damage Control Books for Surface Ships, Revision of  |
| MS1-1971   | Quality Standards for Computer Output Microfilm  |
| MS2-1971   | Format and Coding Computer Output Microfilm  |
| MS5-1975   | Microfiche of Documents  |
| MS8-1974   | Document Mark (Blip) used in Image Mark Retrieval Systems                                    |
| MS-28911A  | Turbine Engine Constant Current Starting Wiring Diagram                                      |
| MIL-HDBK-242   | Functionally Oriented Maintenance Manual (FOMM) Writer and Guide for MIL-M-24100B            |
| MIL-HDBK-303   | Micro-reproduction of Engineering Documents  |
| MIL-HDBK-331   | Directory of DoD Engineering Data Repositories   |
| FPMR Subchpt B,<br>Archives & Records<br>Mgmt #101-11 Subpart<br>101-11.500 thru<br>11.508.2 | Microfilming   |

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| PB 167630   | Federal Microfiche Standards  |
| PH5.3-1973  | 16mm and 35mm Silver Gelatin Microfilms for Reel Reel Applications, Specifications for                                  |
| PH5.6-1968  | 100 Feet Reels for Processed 16mm and 35mm Microfilm  |
| PH5.8-1972  | Unitized Microfilm Carriers (Aperture, Camera, Copy and Image Cards), Dimensions for                                    |
| PH5.9-1970  | Specifications for Microfiches  |
| PH5.12-1973 | Measuring Thickness of Buildup Area on Unitized Microfilm Carriers (Aperture, Camera, Copy and Image Cards), Method for |
| PH5.14-1973 | Determining Adhesion of Protection Sheet to Aperture Adhesive of Unitized Microfilm Carrier (Aperture Card), Method for |
| PH5.21-1975 | Dimensions and Operational Constraints for Single-Core Cartridge for 16mm Processed Microfilm                           |
| PH5.22-1975 | Dimensions and Operational Constraints for Double-Core (Bi-Axial) Cassette for 16mm Processed Microfilm                 |
| X3.5        | Flow Chart Symbols and Their Usage in Information Processing  |
| Y14.5-1973  | Dimensioning and Tolerancing for Engineering Drawings   |
| Y14.15      | Electrical and Electronic Diagrams  |
| Y32.2       | Graphic Symbols for Electrical and Electronic Diagrams  |
| Y32.3       | Welding Symbols   |
| Y32.16      | References Designation for Electrical and Electronic Parts and Equipment  |

AIR FORCE

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| AFLCM 65-22                | Maintenance Engineering, Preparation of Maintenance Work Specifications           |
| AFLCM 65-42                | Parts Kits (Preparation of)   |
| AFLCM 66-6                 | Tools, Templates and Undimensioned Drawings                                       |
| AFLCR-72.2                 | Catalog/Standardization and Engineering Data Manual                               |
| AFLCR-73.2                 | Standardization Technical Information File (TIF) of Ground Support Equipment      |
| AFM 60-352                 | Flight Management Data System: A0201BP(PA)  |
| AFM 66-271                 | Mechanized Time Compliance Technical Order Reporting System                       |
| AFP 12-61                  | Programmed Learning for Maintenance and Disposition of Documentation              |
| AFR 6-6                    | Reproduction - Electronic Composition Systems                                     |
| AFR 8-2                    | Special Publications Systems - Air Force Technical Order System                   |
| AFR 12-40                  | Documentation - Documentation Storage and Retrieval (DS&R) Systems                |
| AFR 12-41                  | Documentation - Engineering Data Service Centers                                  |
| AFR 50-32                  | Training - Reporting, Publishing, and Maintaining Training Course Data            |
| AFR 66-27<br>(DSAR 4151.4) | Defense Supply Agency Maintenance Instructions or Technical Maintenance Standards |
| AFR 67-38                  | Supply - Engineering Data Distribution and Control                                |
| AFR 67-80<br>(DSAR 4185.1) | DSA Technical Data Requirements   |



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| AFR 81-10 | Specifications and Standards - Engineering Drawing System        |
| AFR 81-11 | Specifications and Standards - Engineering Drawing Change System |
| TO-005-1  | Air Force Technical Order System                                 |
| TO-005-2  | Air Force Technical Order Distribution System                    |
| TO-005-5  | Air Force Time Compliance TO System                              |

**ARMY**

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| AMCP 310-4  | Guide for Preparation of Equipment Publications Data Packages                             |
| AMCP 310-5  | Preparation of Illustrations for DA Equipment Publications                                |
| AMCP 750-2  | User's Guide for Army Organizational Maintenance Simulation Model                         |
| AMCP 750-3  | User's Guide for Army Depot Transportation Simulation Model                               |
| AMCP 750-5  | Objective Determination of Maintenance Factors  |
| AMCP 750-6  | Techniques for Determining Optimal Operational Readiness Float                            |
| AMCP 750-7  | Techniques for Determining Repair Cycle Float   |
| AMCP 750-12 | User's Guide for Army Depot Repair and Overhaul Simulation Model                          |
| AMCP 750-13 | User's Guide for Army Direct Support/General Support (DS/GS) Maintenance Simulation Model |
| AMCP 750-14 | Programmers Guide for Army Depot Repair and Overhaul Simulation Model                     |
| AR-30       | ILS Requirements for Aeronautical Systems and Equipment                                   |
| AR-75       | Manuals, Technical: General Style and Format; Microfilm Compatible                        |

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| AR-76               | Manuals, Technical: Aircraft, Equipment, and Component Maintenance; Preparation of; Microfilm Compatible                               |
| AR-78               | Manuals, Technical: Illustrated Parts Break-down; Preparation of; Microfilm Compatible   |
| AR-84               | 16mm Microfilm of Technical Manuals; Requirements for  |
| AR-86               | Manuals, Technical: Shop Process Cards; Development and Preparation of   |
| AR 310-2            | Military Publications - Identification and Distribution of DA Publications and Issue of Agency and Command Administrative Publications |
| AR 310-3            | Military Publications - Preparation, Coordination, and Approval of Department of the Army Publications                                 |
| AR 310-50           | Authorized Abbreviations and Brevity Codes   |
| TB 340-1            | Document Miniaturization - A Basic Guide to Microforms   |
| TM 12-257           | Microfilming of Records  |
| TM 55-405-9         | Army Aviation Maintenance Engineering Manual   |
| TM 55-1500-204-25/1 | General Aircraft Maintenance Manual  |
| TM 55-1500-328-25   | Aeronautical Equipment Maintenance Management Policies and Procedures  |

**MARINE CORPS**

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| MCO 4710.9B   | Rebuild Standards                     |
| MCO P5600.31D | Publications and Printing Regulations |

**NAVY**

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| NAVAIR 00-25-600 | Support of In-Process Review, Validation, and Verification |
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| NAVAIR 00-<br>25-601   | Management and Procedures for Out of Production Category of Aircraft/Equipment Manuals   |
| NAVAIR 00-<br>25-700   | Technical Manual Preparation Guide for Writers, Editors, and Illustrators  |
| NAVAIRINST<br>5400.2   | Technical Manual (stores/aircraft) Verification Capability, Establishment of   |
| NAVAIRINST<br>5600.3E  | Review of Tactical Doctrine Publications   |
| NAVAIRINST<br>5600.3G  | Review of Tactical Warfare Publications  |
| NAVAIRINST<br>5600.5   | NATOPS Flight Manuals/Flight Manuals/Flight Handbooks, System for reparation and Promulgation of Interim Changes to                                  |
| NAVAIRINST<br>5600.5A  | System for Preparation and Promulgation of Interim Changes to NATOPS Flight Manuals  |
| NAVAIRINST<br>5600.7A  | Aeronautical Technical Manual Requirement Codes; Instructions Concerning Determination, Assignment and Approval of,                                  |
| NAVAIRINST<br>5600.9A  | Policies and Responsibilities for Management and Coordination of Technical Manual In-Process Reviews, Validation and Verification                    |
| NAVAIRINST<br>5600.11  | Acquisition of Technical Manuals, Policy for Changes, Revisions, Supplements and Modifications   |
| NAVAIRINST<br>5600.14  | Engineering Drawings (new and revised); Copies to Repository   |
| NAVAIRINST<br>5600.14A | Incorporation of Government Design Change Data to Naval Air Systems Command Drawing Repository Files   |
| NAVAIRINST<br>5600.15A | Requests for Copies of Engineering Drawings for Naval Aircraft, Airborne Weapons, Aeronautic Equipment and Related Ground Support and Test Equipment |
| NAVAIRINST<br>5600.16A | Technical Manual Program; Procedures and Responsibilities for the Planned Maintenance System Technical Documentation                                 |

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| NAVAIRINST<br>5600.19  | Rapid Action Change Program, Responsibilities<br>For Manuals  |
| NAVAIRINST<br>5600.19A | Policy, Procedures and Responsibilities for<br>Technical Manual Rapid Action Change Program                       |
| NAVAIRINST<br>5605.4   | Technical Manual, Aeronautic, Distribution of   |
| NAVAIRINST<br>5605.4A  | Distribution of Aeronautic Technical Publications   |
| NAVAIRINST<br>5700.13  | Joint Atomic Weapons Publications; NAVAIR and<br>NAVSEA Responsibilities for and Information<br>Concerning        |
| NAVFACINST<br>11013.37 | Operating and Maintenance Manuals, Preparation<br>of for Real Property Facilities                                 |
| NAVELEXINST<br>4000.9B | Approval of Systems and Equipments for Service<br>Use (ASU)   |
| NAVELEXINST<br>5600.7  | Acquisition and Quality Assurance of Technical<br>Manuals for New Equipment/Systems; Requirements<br>For,         |
| NAVELEXINST<br>7300.19 | Technical Publication Printing, Procedures  |
| NAVMAT INST<br>4790.5  | MIP and MRC Standardization Handbook  |
| NAVORDINST<br>5600.4A  | Ordnance Technical Manuals, Evaluation, Allowances<br>and Distribution of   |
| NAVPUBINST<br>5070.1   | System Command Technical Manuals, Request for   |
| NAVSEAINST<br>5600.3   | Naval Ship's Technical Manual (NSTM), Proce-<br>dures and Responsibilities for Promulgation<br>and Maintenance of |
| NAVSHIPINST<br>5600.27 | Technical Manual, Preliminary; review of  |
| NAVSHIPINST<br>5604.4A | Document Procurement and Maintenance  |



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| NAVSHIPINST<br>9880.19A | Surface Ships Damage Control Books, Processing<br>of   |
| NAVSO P-35              | Department of the Navy Publications and Printing<br>Regulation   |
| NAVSUPINST<br>5230.3    | Microfilming Program Implementation, Guidelines  |
| NAVSUPINST<br>5600.21   | Navy Publications and Printing of Permanent<br>Changes and Revisions to Technical Manuals  |
| OPNAVINST<br>1552.1B    | Aviation Training Manual, Preparation, Approval,<br>and Distribution   |
| OPNAVINST<br>4790.4     | Maintenance and Material Management Manual   |
| OPNAVINST<br>5510.49A   | Classified Matter; Guide for Handling and Control<br>of  |
| SECNAVINST<br>5350.6B   | Revised Manuals  |
| WR65A                   | Maintenance Analysis and Documentation for<br>Surface Missile System PMS/SMS   |
| WS-4616                 | Preparation of TMs for Planned Maintenance<br>System, Surface Missile Systems (SMS)  |
| WS-10759                | Navord Specification/Purchase Description for<br>Ordnance Publications (Includes System, Sub-<br>system, Equipment Technical Manuals, Planned<br>Maintenance System for (PMS/SMS) Illustration<br>Requirements, Diagrams, etc.)            |
| XWS-17917               | Manuals, Combat Systems, Tactical Operations<br>Requirements for (Includes TM Outline, Arrange-<br>ment, Illustrations, etc, Operational Procedures,<br>etc, Training and Maintenance Concept, Support<br>Elements, Fault Isolation, etc.) |

**DEFENSE LOGISTICS AGENCY**

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| DLAM 5205.1    | Safeguarding Classified Information |
| DLASCR 5025.15 | Graphic Aids                        |

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| DLAR 4151.4  | Defense Logistics Agency Maintenance Instructions or Technical Maintenance Standards    |
| DLAR 4151.9  | Interservicing of Technical Manuals and Related Technology                              |
| DLAR 4185.1  | DLA Technical Data Requirements   |
| DLAR 5015.3  | Microfilming (Records Management)   |
| DLAR 5025.1  | Authentication of DLA Publications  |
| DLAR 5025.23 | Utilization of the Electronic Composing System  |
| DLAR 5330.1  | Procurement and Production of Printing, Duplicating, Micropublishing and Office Copying |

JOINT CHIEFS PUBLICATIONS

|               |   |
|---------------|---|
| JCP No. 23    | Government Printing and Binding Regulations |
| Title 44, USC | Public Printing and Documents               |